A. S. Thomson

Glackmeyer

NEW TRACKS IN NORTH AMERICA.

NEW TRACKS IN NORTH AMERICA.

A Journal of Travel and Adventure

WHILST ENGAGED IN THE SURVEY FOR A SOUTHERN RAILROAD TO THE PACIFIC OCEAN DURING 1867—8.

By WILLIAM A. Abraham BELL, M.A., M.B., Cantab.,

FELLOW OF THE ROYAL GEOGRAPHICAL AND GEOLOGICAL SOCIETIES.

WITH CONTRIBUTIONS BY GENERAL W. J. PALMER, MAJOR A. R. CALHOUN, C. C. PARRY, M.D., AND CAPTAIN W. F. COLTON.

Laying the Track.

SECOND EDITION.

LONDON:
CHAPMAN AND HALL, 193, PICCADILLY.
NEW YORK: SCRIBNER, WELFORD & CO.
1870.

APPENDIX E.

NAMES OF THE MEMBERS OF THE SURVEYING PARTIES.

STAFF.

General William J. Palmer, Director of Surveys.
„ W. W. Wright, Chief Engineer.
Dr. John Le Conte, Geologist.
Dr. Lewis, Entomologist.
Dr. C. C. Parry, Botanist.
Dr. W. A. Bell, Physician.
J. M. Blair, Quarter-Master.
L. T. Stewart, „
T. W. Yardley, „
Captain W. F. Colton, Secretary to General Palmer.
Major A. R. Calhoun, Correspondent, Philadelphia Press.

ENGINEERS.

First Division.

L. H. Eicholtz.
J. A. Latcha.
John A. Leslie.
Hamilton Alricks, Jun.
George H. Clark.
Thomas B. Price.
S. M. Bay.
G. T. Bell.
J. E. Benner.
James Farley.
John D. Criley.
J. W. Nations.

Second Division.

J. Imhrie Miller.
J. H. Hobart.
William G. Snuyzer.
H. A. Suebbers.
Stephen G. Norton.
James L. Drum.
Charles K. Munroe.
Frank Reamy.
Marshall Oakes.
T. J. Snyder.
C. R. Green.
Wilton G. Shock.

Second Division (continued).

S. P. Wells.
Walter Hinchman.
George Weight.

Third Division.

John Runk, Jun.
G. B. Mifflin.
Newton Sebert.
Alfred Watts.
W. W. Finlay.
Harmon L. Miller.
Edward Trapp.
Arthur W. Moore.
W. K. Wallace.
F. T. Brewster.
Michael Cassidy.
William Cullen.
C. E. McLaughlin.
Austin Drake.
C. C. Jewett.
Alonzo Ivers.
Robert Marley.
John Doyle.
James C. Cantwell.
A. D. Comerford.
William Vickery.

Colonel Greenwood, with two other parties, afterwards went to Santa Fé, to join the 2nd Division, and conduct the Surveys on the 35th parallel.

THE END.

PRINTED BY VIRTUE AND CO., CITY ROAD, LONDON.

This Book

I DEDICATE TO MY FATHER IN ENGLAND,

AND TO

GENERAL W. J. PALMER, OF ST. LOUIS, IN AMERICA.

To General W. J. Palmer.

My dear General,

It gives me great pleasure to associate my Father's name with that of the most valued of my American friends, whose intercourse contributed so much to make my sojourn in the Far West a period to which I shall ever look back with the brightest recollections.

Believe me to remain,

My dear General,

Ever yours very sincerely,

W. A. BELL.

New University Club,
St. James's Street,
May 15*th*, 1869.

Vincent Brooks, Day & Son, lith

MOUNT AGASSIZ & THE SAN FRANCISCO PEAKS, ARIZONA

PREFACE.

In placing this book of travels before the public there are some points to be explained, some indulgencies to be asked for, and many friends to be named whose assistance merits my warmest gratitude.

It is right at the outset to remind my readers that they must not criticise a book of travel too severely as a literary production. Whilst the novelist and the historian are always using their pen, the traveller of necessity isolates himself from all literature, and yet when he does write he finds numbered amongst his readers the man of science, the lover of adventure, and the practical public. In order, if possible, to make the following pages acceptable to all, I have tried to arrange my subjects in such a way that any special topic can be omitted without difficulty by those whom it does not interest.

The success with which the Royal Geographical Society has for years been conducting its meetings has made that branch of science quite popular, at least amongst the reading public of London. I feel, therefore, that no apology is

necessary for having devoted the first fifty pages to Physical Geography, pure and simple. In like manner the five chapters which form Part II. have been devoted to Ethnology—to a terse account of aboriginal tribes, well worthy of study. As the different races of man are at the present time occupying much public attention, this will, I trust, be acceptable.

I have been in considerable perplexity as to the best way of treating the bulk of my narrative, chiefly because it was impossible to forget the fact, that whatever interest the book might excite would be shared by the American as well as the English reader. I have used many words which are foreign to ourselves; I have often transgressed in like manner the ordinary phraseology of our Atlantic cousins. I have also borne in mind from the commencement, and indeed it was impossible for an eye-witness to forget, that the country of which I treat, though it is almost without tillage or inhabitants, is not like Africa, Central Asia, or even South America, in being far removed from the present limits of Anglo-Saxon occupation; but that it contains cradles for nations which are destined to spring from our own hardy and prolific stock, and that practical and special knowledge about it is desired, in the first place, by the Americans themselves; in the second place by our own nation, supplying, as it does, at least two-thirds of the emigrating population of Europe.

In reading some of the chapters in Part III., it must not be supposed that because the scenes there related are unusually strange, they are of necessity highly coloured, for this is not the case. I have kept closely to fact throughout, and even in choosing my illustrations have taken great pains that everything should be true to nature. Here and there a figure has been introduced by the artist, but with very few exceptions all are exact copies from photographs taken on the spot.

My best thanks are due to Dr. John Le Conte, of Philadelphia, through whose personal influence I became a member of the expedition to survey a route for the Southern Trans-continental Railway.

To Mr. Aubrey Smith, of Philadelphia, I am indebted for having taken charge of my little botanical collection; for having, with infinite trouble, obtained the names of nearly all the plants from the most distinguished botanists in the United States; and for having sent them to me, thus named, in the best possible condition.

General Palmer, of St. Louis, has not only given me access to all the documents connected with the railway survey, and offered me all possible assistance, but he has contributed one of the most thrilling incidents related in the following pages. These services, however, I value as nothing compared with the warm friendship which our travels together have matured.

To Captain Colton I offer my best thanks for the valuable

contributions which, true to his promise, he has sent me relative to a district over which I did not pass.

I gratefully acknowledge the service rendered to me by Mr. John Browne, of Philadelphia, who, as an amateur, has acquired a high reputation amongst photographers. Mr. Browne not only initiated me into the art, but sent out after me all the necessary instruments and chemicals.

It is with great pleasure also that I thank Major Calhoun and Dr. Parry for their valuable contributions, both in the field of adventure and science.

Lastly, I shall not soon forget the debt of gratitude I owe to my fellow-countryman and friend Mr. R. K. Cautley, whose assistance during the production of this book has been unceasing.

W. A. BELL.

18, Hertford Street,
Mayfair, London,
May, 1869.

CONTENTS.

INTRODUCTION.

PART I.

FROM THE MISSISSIPPI RIVER TO THE RIO GRANDE DEL NORTE.

CHAPTER I.

CHAPTER II.

CHAPTER III.

CHAPTER IV.

CHAPTER V.

CHAPTER VI.

PART II.

THE NATIVE RACES OF NEW MEXICO AND ARIZONA.

PART III.

FROM THE RIO GRANDE DEL NORTE TO THE PACIFIC OCEAN.

APPENDICES.

ILLUSTRATIONS.

LITHOGRAPHS.

BOTANICAL PLATES.

WOODCUT ILLUSTRATIONS.

NEW TRACKS IN NORTH AMERICA.

INTRODUCTION.

I.

SKETCH OF THE ROUTE.

In the spring of 1867 a very extensive surveying expedition was organised by the Kansas Pacific Railway Company, in order to determine upon the best route for a southern railway to the Pacific coast through Kansas, Colorado, New Mexico, Arizona, and the southern part of California. Until the Rio Grande del Norte (about equidistant from the Mississippi and the Pacific) had been reached, three separate surveying parties were required; but between that river and the Pacific coast, no less than five parties, each capable of making an accurate instrumental survey, were employed, and crossed that part of the continent by different routes on different parallels of latitude. The United States Government, by furnishing escorts and transportation, rendered assistance without which such an undertaking would at that time have been impossible, for most of the Indian tribes were at war with the whites.

Through the kindness of some of my friends in Philadelphia, I became attached to this expedition; but not until

all the vacancies but one had been filled up. A photographer alone was wanted; and as no idle man could be allowed amongst the party, I accepted the office with, I must confess, considerable diffidence, as only a fortnight remained before starting to learn an art with which I was then quite unacquainted. After we had been in the field but a short time, the return home of the physician of the expedition left that post open to me. It proved to be almost a sinecure, for the healthy life we led in such a glorious climate was far better than physic. Thus it happened that, taking no part in the actual surveys, I was able to move hither and thither, to travel sometimes with one party, sometimes with another, and to take long journeys independently through regions hitherto almost unknown, but which, from their position, were of great importance to those interested in the success of the trans-continental railway.

The distance I travelled beyond the pale of civilisation and railways was about 5,000 miles; this distance, however, was but a fraction of the combined lengths of route surveyed and examined by the separate parties. I now proceed to give an outline of these routes.

From St. Louis, the starting-point, we went by rail to Salina (Kansas), the terminal depôt at that time of the Kansas Pacific Railway. At this point, 471 miles west of the Mississippi, we exchanged the locomotive for the mule train, and marched due west over a sea of grass for 216 miles to Fort Wallace, a military post on the borders of the State of Colorado.

On this vast plain the buffalo are still very abundant. After a delay of a fortnight at Fort Wallace, caused by the hostility of the plain Indians, we commenced our survey at that point, and proceeded in a south-westerly direction

across a desert region to the Arkansas River, and up that stream to New Fort Lyon, a point close to the mouth of the Purgatoire River. Distance, 114 miles.

From Fort Lyon one of our parties continued to ascend the Arkansas River until it reached a tributary called the Huerfano, which it followed into the most elevated portion of the North American continent—the centre of Colorado—where the Arkansas, Rio Colorado of the West, Platte, and Rio Grande del Norte have their sources. Having surveyed several passes in this region, the party descended the last-named stream for about 380 miles to Fort Craig, in southern New Mexico.

Two parties, to one of which I was attached, surveyed a route from Fort Lyon up the Purgatoire River, and across the Raton Mountains to Los Vegas, 230 miles; thence around the southern extremity of the Rocky Mountains into the valley of the Rio Grande del Norte, and down that valley from Albuquerque to Fort Craig, 219 miles farther. In the valley of the Rio Grande, the fast-disappearing remnants of the Aztec nation—the Pueblo or Town Indians—are still to be found living in peaceful simplicity in their villages, and raising their fruits and crops by a well-regulated system of irrigation.

At Fort Craig our parties were reorganised, their numbers increased, and the escorts doubled, preparatory to exploring the more difficult country lying to the westward.

From the Rio Grande to the Rio Colorado of the West, and thence across the desert, or Great Basin, as it is commonly called, into California, our parties surveyed and examined two entirely different districts, lying parallel to each other, but separated by lofty mountains and table-lands, and distant usually about 2°. One party, consisting of three bodies

of surveyors, passed into California through the Moqui (a semi-civilised race of Indians) country and Northern Arizona,—a land abounding in wild and beautiful scenery, and studded all over with the ruins of a large native population now extinct.

This country was explored some years since—first by Whipple (1854-5), and afterwards by Beal (1858). It lies about the 35th parallel of latitude, and is known as the 35th parallel route across the continent.

The other part of our expedition, consisting of two surveying parties, continued to descend the Rio Grande valley for seventy-two miles below Fort Craig before turning westward. They then explored the barren districts lying between the Rio Gila and the boundary of Mexico. As the 32nd parallel of latitude traverses this region, the route through it is called the 32nd parallel route.

After visiting many places of interest in New Mexico, I took the 32nd parallel route, and travelled with one or other of the parties to Camp Grant, in the centre of Arizona. In this distance, which by the continuous line surveyed by one party was found to be 345 miles, we crossed many mountain ranges, traversed the Great Madre Plateau, and passed through a gorge—the Aravaypa Cañon—of unusual grandeur and interest. I left the surveying parties at Camp Grant, and travelled, with a single companion as guide, in almost a due southerly direction for 600 miles, through the State of Sonora, in Mexico proper, to the port of Guaymas, in the Gulf of California. The object of this trip was to obtain as much general information as possible respecting that State, especially as to its mineral and agricultural merits, and the feasibility or otherwise of constructing a branch railway through it to Guaymas. After visiting Carmen Island, La

Paz, and Mazatlan, in the Gulf, I sailed northward to San Francisco, where, in course of time, all our surveying parties collected.

About the middle of February, 1868, I started afresh from San Francisco, and recrossed the continent about the 41st parallel of latitude. The Sierra Nevada and Rocky Mountains were this time crossed in the depth of winter; the desert or Great Basin was traversed at a part where it is 700 miles wide. I visited the Comstock lode, the largest silver lode yet discovered, and other mining districts in "The Basin;" I passed through Great Salt Lake City, thence visited Denver, and finally completed the circle of travel by striking my old route at Fort Wallace. As the greater part of this return-journey was made by the well-known overland route through Nebraska, Utah, and Nevada, I have thought it unnecessary to give a detailed description of it, but have endeavoured to contrast fairly this strip of country with those over which our parties passed about the 35th and 32nd parallels respectively.

The accounts of adventure, Indian fights, &c., scattered through the following pages, are, with a few insignificant exceptions, the unvarnished recitals of events in which we ourselves took part or were closely connected.

Several articles, upon districts surveyed by our parties, but not visited by me, have, through the kindness of friends, been contributed to this book. One article describes the country from Camp Grant, where I left my friends, westward to the Pacific Ocean; another gives an account of the passage of the Great Cañon of the Colorado by a man named James White, whom some of the members of the expedition met at Fort Mojave, a point south of the mouth of the cañon; in the Appendix will be found an article written by our botanist,

together with a catalogue of plants indigenous to the regions traversed by us, dried specimens of the greater number of which I have been able to collect and place in the Botanical Department of the British Museum. Another friend has given me his assistance in describing the 35th parallel route, along which I did not pass.

I have explained the physical geography of the country west of the Mississippi, across which the Americans are constructing two, if not three, trans-continental railways, at some length, and have placed it at the end of this Introduction, because I desire that those of my readers who are especially interested in the Western country should carefully read it before commencing the narrative.

When in the following pages mention is made of the Southern or the Kansas Pacific Railway, the same railway will be implied, viz., that formerly called the Union Pacific Railroad, Eastern Division, now being constructed through Kansas, Colorado, New Mexico, Arizona, and the southern part of California to San Francisco. When the central route or railway is referred to, then that Union Pacific Railway which passes by Salt Lake, through Nebraska, Wyoming, Utah, Nevada, and California to San Francisco must be understood. Farther north still, a third line is in contemplation, uniting the waters of Lake Superior with the Pacific at Portland and Seattle. This railway is known by one name only—the Northern Pacific Railroad.

The last Part is devoted to railway topics and emigration, and is intended to explain the *modus operandi* of Pacific railway construction in the United States—a subject which at present is attracting considerable attention. In a small country like England, railways are, comparatively speaking, a luxury, and are only carried through districts sufficiently

populous to warrant their construction; but in the great West, where continuous settlement is impossible, where, instead of navigable rivers, we find arid deserts, but where, nevertheless, spots of great fertility and the richest prizes of the mineral kingdom tempt men onward into those vast regions, railways become almost a necessity of existence—certainly of development; and the locomotive has to lead instead of follow the tide of population.

II.

GENERAL FEATURES OF THE MISSISSIPPI BASIN, AND OF THE WATERSHED OF THE ROCKY MOUNTAINS.

The Country east of the Mississippi.—The Basin taken as a whole.—The rise of the Country from South to North; from East to West.—The "Summit Plateau."—The Table-lands lying between the Summit Plateau and the Sierra Nevada.—Physical Geography of California.—The Rocky Mountains.—The Dual Main Chains.—The Central Parks.—Primary "Divides" or Water-partings.—Sources of the Great Rivers, the Missouri and Tributaries, the Columbia, Rio Colorado, Arkansas, Rio Grande del Norte.—The General Features of the Districts through which the Three Great Railways are to pass are especially noticed.—The term Rocky Mountains ought to be limited to the Mountain Ranges only which rise from the "Summit Plateau."

THE United States, or rather the great central division of North America, is divided into three nearly equal parts by the Mississippi River and the so-called Rocky Mountains. The average width of each division is about 15°, or 1,042 miles; so that the Atlantic is separated from the Mississippi, which runs nearly north and south, by a belt of country usually not much more than 1,000 miles across, while the Pacific Ocean is double that distance from the Mississippi. *The entire Central third* of the country, with the small exception of Southern Texas and part of New Mexico, is drained by Western branches of the Mississippi, viz., the Minnesota, Des Moins, Missouri, Arkansas, Red River, and their tributaries. The area of territory thus drained is about 1,231,000 square miles (geographical), an extent of surface six times as large as France. Of the *Eastern third* scarcely a quarter is drained by tributaries of the Mississippi; for the Appalachian range limits its basin on the south-east, and the highlands parallel to the

great lakes separate it towards the north and north-east from the latter, and from the basin of the St. Lawrence, leaving a triangle scarcely larger than France to supply the great tributaries of the Ohio River.

The *Western third*—that is, of the country between the Pacific Ocean and the Rocky Mountains—is so cut up by mountains, that we shall leave the consideration of its drainage for the present.

The physical geography of the Western two-thirds, which consists of the country west of the Mississippi, is peculiar, although by no means complicated, and will exclusively occupy our attention.

I will first indicate the general rise of these regions, from the Mississippi on the east and the Pacific on the west, to their lofty central elevations, and then discuss the several mountain systems which have been upheaved by forces very different, both in degree and mode of action, from those which uniformly raised the entire country from its bases to its centre.

From the Gulf of Mexico, where the elevation is nil, passing northward up the Mississippi, we do not rise more than 470 feet during the 1,202 miles from the mouth of the river to St. Louis.

During the next 730 miles, up to St. Paul, the rise is again nearly 470 feet. The falls of St. Anthony, nineteen miles above St. Paul's, are the limit to which continuous steam navigation at present extends, the total distance being 1,952 miles.

A hundred miles further up stream the elevation is found to be 1,152 feet, which is not much below that of the little lakes from which the head-waters rise. Lake Superior lies from fifty to a hundred miles only to the east of these lakes, and has an elevation of 600 feet, while the land intervening, which

forms the divide,* can be crossed at an elevation of 1,158 feet, on the same parallel as the southern shore of Lake Superior. From the head-waters of the Mississippi northward, the land falls gradually towards Lake Winnipeg in British territory. Thus the rise of the continent, north and south, only just exceeds 1,000 feet.

Passing *westward* from the Mississippi, and disregarding mountains altogether for the present, the elevation of the continent gradually increases, until it attains its highest level at South *Park*, about the centre of Colorado. If we compare the rise and fall of the continent on all sides to two saddles, placed pommel to pommel, the pommels will represent South Park, the highest part of the median line of maximum elevation, while the prominence sloping downwards from each pommel, and disappearing at the back of each saddle, will well illustrate the course of the "Summit Plateau." For this "Summit Plateau," if it may be so called, diverges from its greatest elevation in a north-westerly direction, to form the less elevated watershed in Montana, between the heads of the Missouri and Columbia rivers; while to the southward it gradually falls also, and

* The term "divide," used as a substantive, may be objected to, on the ground that it is not English. This I grant; but as it is in common use throughout North America, is often to be heard at the Meetings of the Royal Geographical Society, and is frequently so printed in their Reports, I have preferred to use it generally instead of its synonym "water-parting," because, in such compound expressions as "secondary water-parting" or "continental water-parting," "secondary divide" or "continental divide," sounds shorter and crisper. "Dividing-ridge," of course, is only applicable when a mountain range forms the divide.

It may be well at the outset to give the following definitions :—

A *watershed* is the *slope* between a water-parting, or divide, and a watercourse.

A *divide* is the boundary-line between contiguous basins and watersheds.

Two watersheds united at their watercourses constitute a *valley*.

The whole series of valleys traversed by a river and its tributaries of the first, second, third order, &c., constitutes a *basin*.

(*See* "Physical Geography," from the French of Th. Lavallée. Edited by Captain Lendy, F.G.S.)

widens out into the Llano Estacado (staked plains) of Northern Texas, and the vast plain—the Madre Plateau—which occupies Southern New Mexico.

A few figures, representing average elevations only, may be desirable. The staked plains of Texas average 3,500 feet; the Madre Plateau about 4,000. Rising from these, and passing northwards, the "Summit Plateau" attains an average elevation of 7,000 feet in Northern New Mexico, of from 8,000 to 9,000 feet in Colorado, 7,000 in Wyoming, and from 5,000 to 2,000 in Montana, whence it passes into British territory.

The country lying between the highest portions of the "Summit Plateau" in Colorado and the Mississippi ascends far more rapidly than the adjoining country south of it, which does not ultimately attain in New Mexico so great an elevation; while to the north of Nebraska, Kansas, and Colorado, the country has not only a still lower elevation to reach on the Summit Plateau in Montana, but (consequent upon the north-westerly direction of that central line of maximum elevation) has a far longer distance in which to reach it. We therefore actually find what theoretically we should expect—that the largest river in the continent flows through this district.

The Missouri at Fort Benton, the head of steamboat navigation, is 2,500 miles by water from its mouth, and 3,737 from tide water, and yet at the 111th meridian (South Park being on the 106th) it is only 3,000 feet above the sea. The cause is obvious. The streams of the high lands of Western Montana, where the springs do not average more than 6,000 feet, pass northwards around the most lofty part of the continent, and do not commence a southward course towards the Gulf until 700 miles separate them from their western

sources. United then into one vast stream (the Missouri), they meander through the less elevated districts, receiving the Platte tributary at an elevation of 968 feet, and the Kansas River at 710, before joining the Mississippi at an elevation of 460 feet.

The streams which cross the elevated country avoided by the Missouri, namely, as before mentioned, Nebraska, Kansas, and Colorado, give very different results. The most westerly sources of the North Platte rise about 2° east by 4° south of those of the Missouri. But the Sweet-water branch has an elevation of 7,220 feet in the highest plateaux; Medicine Bow Creek, 7,000; Laramie River, 7,175; while the South Platte at Denver, on the plains, is 5,000 feet above the sea; and farther up the stream, in the level portion of South Park, it attains no less an elevation than 9,000 feet. The Arkansas and Canadian rivers in the same manner pass at first through very elevated regions, not taking into account at all the actual mountains or the mountain streams which debouch upon these upland plateaux, for at present I refer only to the general elevation of the country.

West of the "Summit Plateau," the country falls at first, but only to a limited extent compared with the eastern slope; for the entire district lying between the "Summit Plateau" and the Sierra Nevada consists of table-lands, varying in elevation from 4,000 to 8,000 feet above the sea. The elevation of nearly all Utah exceeds 5,000 feet, excepting only a part of the Great Salt Lake basin, the surface of which lake is 4,290 feet. Utah Lake, whose surplus waters fall into Great Salt Lake, is 4,790 feet high, and Lake Sevier, situated further south in the same basin, is, if anything, a little lower.

The greater part of Nevada lies between 4,000 and 6,000 feet above the sea, but to the southward the land falls

gradually, though unevenly, towards the Rio Colorado, and indirectly towards the Gulf of California. A remarkable depression occurs about latitude 36°, which is separated both from the Rio Colorado and the Gulf by table-lands varying in height from 1,000 to 5,000 feet above its lowest portion. This depression is known as Death Valley.

Lofty table-lands extend also over all New Mexico and Arizona, but gradually fall away towards the mouth of the Rio Gila and the Gulf of California, in the south-west angle of the latter territory. In Southern New Mexico the entire country becomes depressed into an extended plain,* about the 32nd parallel, having an average elevation of from 3,500 to 4,000 feet. The depression, however, does not extend south more than from fifty to one hundred miles before the general rise commences, which forms the lofty savannas of Mexico, upon which the mountain ranges of that country rest.

West of the Sierra Nevada of California, the land slopes rapidly towards the west coast. Nature has, however, placed a barrier in the way by throwing up a series of ranges along the coast, known as the coast ranges. They run for the most part parallel to each other, but obliquely to the coast, so that range after range becomes lost in the sea, forming prominent headlands and rocky islands all along the shore. About the centre of the Californian coast, a great gap occurs in these

* The first promoters of the grand scheme for uniting the Atlantic and Pacific by a railway crossing the continent in United States territory seem to have laid great stress upon the importance of this depression. They affirmed, and with truth, that if the waters of the Atlantic and Pacific were to rise to the height of 4,000 feet, they would meet about the 32nd parallel, leaving two huge islands, the one to represent the lofty plateaux and mountains of the Western territories, the other the still more elevated plateaux of Mexico. They thought it probable that this depression would prove to be the only practicable route for the Pacific Railway, and on that account urged the United States Government to buy it from Mexico. This was done on the 20th of June, 1854; ten million dollars were paid for it, and the official document fixing the new boundary is called the Gadsden Treaty.

ranges, which forms the "Golden Gate" of San Francisco. The sea enters through the narrow channel, and spreads out into three large basins, protected on all sides by mountains belonging to the coast ranges, thus forming the best and largest harbour in the world.

Between the coast ranges and the lofty Sierra Nevada lies a wide plain or valley, averaging some sixty miles across, and extending north and south for nearly the entire length of the State. The waters which flow from the western slope of the Sierras and collect in this inland valley cannot penetrate the coast ranges, and go direct to the sea. So those of Southern California form the San Joaquin River, and those of Northern California, the Sacramento; the former runs to the northward, and the latter to the southward, in the trough between the outer and inner mountain chains, and both empty themselves into the Bay of San Francisco. This is the drainage system of California.

I have briefly indicated the course which the general rise or upheaval of the continent has taken. We will now consider the excrescences and irregularities on its surface.

The entire country between the Alleghanies (Appalachian range) and the "Summit Plateau," which extends from the Gulf of Mexico in the South to the watershed of Hudson's Bay in the North, is mainly one vast flat for thousands of square miles in the prairie States east of the Mississippi; more or less undulating on the western plains, most depressed in the valleys of the Mississippi, Ohio, and Missouri, and only sufficiently elevated at its northern limit to determine the flow of the waters in the two opposite directions, north and south. Scarcely a trace of volcanic disturbance is to be seen in all this vast region. On the "Summit Plateau," however, mountains for the first time rise from the plains. All along the

axis of *general elevation*, independent ranges, varying considerably in direction, height, and extent, have been piled up in great apparent confusion, while here and there some very lofty peaks mark the probable centre of volcanic action in special localities.

The explorations made under the auspices of the American Government, and embodied in the bulky volumes of the Pacific Railway Reports, have been followed up by surveys and explorations, undertaken by private companies and others, so that the knowledge acquired from these many sources has, I think, disclosed a certain regularity of design throughout the entire "Summit Plateau" system, which greatly simplifies its topography.

To the question, Where is the central range of the Rocky Mountains? I confidently answer, Nowhere! There is no continuous central chain whatever. It appears to me, on the contrary, from my own observations, and from diligently examining the explorations of others, that the so-called Rocky Mountain system, from the northern boundary of the United States to their southern termination, consists usually of two chains of mountain ranges, occupying the eastern and western edges of the "Summit Plateau," and separating it from the plains on either side.

These eastern and western chains communicate by means of transverse ridges at irregular distances, thus cutting up the "Summit Plateau" lying between them into a succession of isolated plains or "parks" of great elevation.

The word "park," in Rocky Mountain phraseology, has a specific signification, and is used exclusively to designate those lofty, well-watered plains, or prairies, to be found all along the "Summit Plateau," shut in on all sides by mountains.

Secondary ranges radiate from the primary chains, and jut

out into the less elevated plains, east and west, along the whole extent; while the surface of the central or park districts is not unfrequently much disturbed by lesser ranges piled up in endless confusion.

The "continental divide," by which I always mean the water-parting of the Atlantic and the Pacific rivers, sometimes passes through the western chain and sometimes through the eastern, crossing and recrossing the "Summit Plateau" by means of the transverse ridges. Had the "Summit Plateau" been capped by one vast central pile, this would not have been the case.

Again, the points which show signs, by their lofty peaks, of the most intense volcanic action, and, by the ranges radiating from them, that they were the centres of mountain-making forces, are always to be found along the western or eastern main chains, at the edges, and not in the centre of the "Summit Plateau," which represents the back-bone of the general upheaval of the continent.

Such volcanic peaks are:—

Fremont's Peak	13,570 feet.
Laramie Peak	not known.
Long's Peak	13,575 feet.
Mount Lincoln*	17,000 feet.
Mount Gray	14,400 feet.
Pike's Peak	not known.
Spanish Peak	11,000 feet.

None of which have a central position on the "Summit Plateau."

The general direction of the "Dual Main Chains" is the same as that of the "Summit Plateau," upon which they rest. From the 49th to the 42nd parallels it is north-west and south-east; from the 42nd to the 38th, nearly north and south. From about this parallel the main chains part com-

* On a transverse ridge, although nearly central.

pany. The course of the eastern ranges is mostly north and south, until they become lost in the detached mountains between the Rio Grande and the Pecos River; the western ranges run more west of south, until they sink below the surface in the great Madre Plateau of New Mexico.

All the innumerable ranges of hills and mountains which cover the regions west of the main chains, and east of the Sierra Nevada, and which do not obviously jut out from the former, ought not to be placed under the head of the Rocky Mountain system. Such a classification only causes confusion, and is not warranted either from the physical relations or geological formation of the mountains themselves.

To establish the truth of the above assertions with respect to the Rocky Mountains and their general topography, I must refer to the map, while I very briefly point out the facts which have led me to such conclusions.

Commencing at the north, near the British American frontier, the two main chains are represented by the Bitter Root Mountains on the west, and by the "Flat Head Mountains"* on the east. A transverse range, The Big Hole Mountains, unites these ranges a little south of the 48th parallel.

The Park region, thus enclosed, is fully one hundred miles across, by thrice that distance in length. It is traversed in all directions by lesser ranges covered with pine, and enclosing parks and prairies, forests and lakes.

The general slope of this country is towards the north-west, and the only outlet through which the drainage of the entire district can escape is in that direction. The stream there formed is known as Clark's Fork, and is the main

* Name not permanently fixed, sometimes called Deer Park Mountains. I prefer the name derived from the Indians who inhabit these regions.

branch of the Columbia River. This region is at present of special interest, as being that through which the Northern Pacific Railway Company proposes to cross the "Summit Plateau." They intend entering it through Cadott's Pass, in the Flat Head range, crossing at this point the continental divide (which is found here in the eastern main chain), at an elevation of 5,330 feet. The railroad must then follow the general direction of the drainage towards the north-west, so as to pass around the northern extremity of the Bitter Root Mountains, which it heads near Pend d'Oreille Lake, only 2,020 feet above the sea, and 240 miles from Cadott's Pass. As this pass (Cadott's) is only one out of several at the back of Helena, and as it entails a long tunnel, a better route will in all probability be found when the district is thoroughly surveyed. All this region abounds in mineral wealth, especially in gold leads, which have of late years been so productive as to make Helena, the centre of the largest mining district, a place of considerable importance.

The continental divide, having crossed the "Summit Plateau" through the Big Hole Mountains, traverses the western chain in a south-easterly direction for about a hundred miles, where it crosses the "Summit Plateau," for a second time, at right angles, passes into the Wind River Mountains, and then resumes its former general direction southward. The eastern chain is here represented by hills forming the local divide between the Maddison and Jefferson rivers, which are the terminal forks of the Missouri. The central, or Park district, much resembles that separated from it by the Big Hole transverse range. It is hilly, heavily timbered in places, and contains several fertile parks, such as Big Hole Prairie, Horse Prairie, and Hooked Man's Park.

The duality of the chief ranges is not clearly defined for

the next hundred miles; nor is this surprising, considering that in this section one of the main divides of the western country —viz., that between the waters of the Gulf of California and those of the Northern Pacific—joins the mountains on the "Summit Plateau." A little north of Fremont's Peak, the most lofty summit of the Wind River range (elevation 13,570 feet), the Bear Mountains jut out towards the Great Wahsatch range, as á spur from the Rocky Mountain system. Along this range the divide passes—the waters destined for the Gulf of California, which flow south, being represented by the heads of Green River, the northern branch of the Rio Colorado; and those of the Northern Pacific by the terminal branches of Lewis Fork or Snake River, which latter flows into the Columbia.

To the north-east of the Wind River Mountains, and rising from the plains, are the Big Horn, the Snow, the Girdle, and other "lost mountains," our present ignorance of which, both topographical and geological, will not allow us to group into any general system.

South-east of the Wind River Mountains, and forming its southern continuation, runs a range of hills upon the western edge of the lofty "Summit Plateau," representing the western main chain. Along this range passes the continental divide, having South Pass, Bridger's, and others in its course. The eastern main chain is here called the Black Hills; that part of the "Summit Plateau" which intervenes is the level park district, known as the Laramie Plains.

The great elevation of these plains, which exceeds 7,000 feet, coupled with their high latitude, renders them useless for agriculture, although for the most part they are good grazing lands. The mountains, however, present so small an obstacle to engineering works (having in reality sunk into hills), that

the Union Pacific Railway Company has chosen this district as affording the best passage across the continent for the central route. They have cut through the Black Hills by means of a short tunnel at Cheyenne Pass (elevation 8,242 feet), with an average grade of 74 feet per mile, have laid the iron ways across the level "Summit Plateau" (Laramie Plains), and have crossed the continental divide by a still less difficult pass than that through the Black Hills (situated about midway between South Pass and Bridger's), at an elevation of 7,534 feet.

These elevations are enormous, surpassing even the famous Summit Railway which crosses Mont Cenis at an elevation of 6,800 feet. There are few engineering difficulties, however, to contend against, and the construction of the railway is comparatively inexpensive.

The continental divide continues its south-easterly direction for about fifty miles from Bridger's Pass in the western main chain, then passes due south for another fifty miles, and then crosses the "Summit Plateau" from the western to the eastern main chain. The portion of the plateau north of this transverse range (for such is the divide here) is known as North Park; it is cut off from the Laramie Plains by a minor range, and is shut in along its eastern boundary by the eastern main chain, a spur of which juts up into the Laramie Plains, as the Medicine Bow Mountains.

The only outlet for the drainage of North Park is through a cleft in its northern boundary. Through this the waters run, forming the north fork of the Platte River. This stream traverses the Laramie Plains, passes out at their north-western corner, winds eastward around the Black Hills, and finally crosses the plains of Nebraska towards the Missouri River.

Having crossed by the southern mountain boundary of North Park into the eastern main chain, the continental divide lies now on the eastern side of the "Summit Plateau," but only through 1°; it then crosses again from Long's Peak to the western chain, forming three sides of a square, enclosing the next park, Middle Park, which, of course, is drained by streams flowing west. These streams are the head-waters of Grand River; they escape through a cleft in the western main chain, and, uniting eventually with Green River, form the Great Colorado of the West.

The next section of the "Summit Plateau" is South Park; it is hemmed in on all sides, like the other parks, by mountains, the eastern and western main chains being well defined. The continental divide traverses the northern and western ranges which bound the park. The drainage is collected into two streams, and passes through the other two sides; that through the eastern forms the south fork of the Platte, while that which escapes through the southern becomes the Arkansas River.

South of South Park the two main chains of the Rocky Mountain system are never again united by transverse ranges, but diverge very considerably, as may be seen by referring to the map. In the fork thus formed rise the head-waters of the Rio Grande, and as the ranges diverge, so does the valley of this important river widen out. High up in the fork the "Summit Plateau" is called the St. Louis Park, and with its crystal streams, its corn-fields, and its lake abounding in trout, is well deemed the most beautiful of all the Parks. It is no less than 7,500 feet above the sea; the mountains bounding it on the east are called the Sierra Blanca, and those on the west the Sierra de San Juan.

Gradually the "Summit Plateau" widens out, and sinks

to the southward, until it can no longer be recognised as a distinct table-land. The following elevations along the Rio Grande valley, from the St. Louis Park to the Mexican frontier, demonstrate the downward slope most clearly:—

	Intermediate distances in miles.	Elevations.
St. Louis Park		7,567
Santa Fé	150·0	6,846
Albuquerque	62·96	5,033
Isletta	14·0	5,022
Fort Craig	111	4,508
El Paso	147	3,830

South of El Paso, the Rio Grande encounters the eastern extremity of the central plateau of Mexico, and, like a true Western river, cuts its way through it, forming for nearly 180 miles a succession of magnificent cañons.

The eastern chain of the Rocky Mountain system terminates a few miles south-east of Santa Fé, scarcely reaching the 35th parallel; for the long narrow ranges of gold and silver-bearing mountains, the Placer, Zandia, Manzana, Soledad, Organ, &c., which form almost an unbroken chain along the eastern side of the Rio Grande valley, should not be classed in the Rocky Mountain system; they are different in formation, and more recent in date.

The western chain continues from South Park, to represent the continental divide. In it different ranges have received special local names, but all are spoken of in general terms as the "Sierra Madre of New Mexico." How many, or how few, of these ranges, from the Sierra de San Juan north of the 47th parallel to the Miembres and Burro Mountains, which form the northern boundary of the great Madre Plateau south of the 33rd, ought to be considered as southern continuations of the Rocky Mountain system, must remain undecided until the country north of Mount Taylor is better known. I

expect that a well-marked geological separation will then be found to exist between the more recent volcanic formations of which that mountain and its southern continuations are composed, and the far older structures and primitive upheavals characteristic of the true Rocky Mountain system.

III.

GENERAL FEATURES OF THE COLORADO BASIN.

The Three Great River Basins west of the Rocky Mountains compared.—The Wahsatch Mountains.—Lieutenant Ives' Expedition.—The Colorado Basin consists of a succession of lofty, arid Table-lands.—Dr. Newberry on the Origin of the Strata forming these Table-lands.—The Drainage passes usually through Cañons.—The Colorado Plateau, and the Great Cañon which passes through it.—How are Cañons formed?—To what causes are due the Table-land features of the Country?—Central Arizona.—The Mogollon, San Francisco, Pina-leño, Sierra Madre, and other Mountains in the Colorado Basin.—Valleys of the Rio Colorado.—Valley of the Rio Gila.

The country lying between the Rocky Mountains and the Sierra Nevada consists of three regions. The basin of the Columbia River forms the northern, that of the Colorado the eastern and southern, and that of the Great Basin system the western. There is not very much difference between the areas of these districts.

	Square miles.
The basin of the Columbia River has an area of about	230,000
That of the Colorado	200,000
That of the Great Basin	280,000
For the sake of comparison, the area of France is	210,000
That of the Mississippi Basin	1,400,000
That of the Rio Grande del Norte Basin	210,000

As we do not enter the basin of the Columbia River in any part of our travels, I shall confine my observations exclusively to the other two sections of country; only remarking here, that the divide which separates the *Columbian Basin* from the *Great Basin* system passes from the southern extremity of the Blue Mountains of Oregon in a south-westerly

direction, into the *Sierra Nevada* system, about latitude 42°, and in a south-easterly direction almost to the great bend of Humboldt River; thence it passes a little northward again, as the ranges north of the Great Basin indicate, between that river and the Snake, until it enters the northern extremity of the Wahsatch Mountains.

From the northern extremity of these Wahsatch Mountains a short range, named the Bear Mountains, passes, as I have before said, into the Rocky Mountain chain. This range separates the Columbia from the Colorado Basin, and is the ridge by which this divide unites with the main divide of the continent.

Between the main chains of the Rocky Mountains and the Sierra Nevada, the Wahsatch range is the largest and most important. It extends from latitude 41°, north of Great Salt Lake, almost to lat. 34°. For the first half of this distance its general direction is nearly south; for the latter, south-west; so that it passes from the 111th to the 115th meridian. Throughout its entire length it forms the divide between the waters of the Colorado and the Great Basin.

About the head-waters of Bear River, one of the three tributaries of Great Salt Lake, this divide appears to require some slight explanation. Although Great Salt Lake is 4,290 feet above the sea, and the Wahsatch Mountains rise in magnificent proportions to the east and north-east of it, yet this most western part of the range does not represent the rim of the basin—the dividing ridge between the waters of Salt Lake and the Rio Colorado—for the country behind is still higher; and the mountains themselves in this locality are some seventy miles across. The consequence is, that the rim of the basin is found to lie some sixty miles east of the western slopes of the mountains.

The drainage of this mountain belt of sixty miles collects in a central trough as Bear River. The river flows northward in this trough in the mountains for about 300 miles, then bends westward around the western barriers, and flows southward into Great Salt Lake.

The Central Railway route (Union Pacific Railway) crosses the Wahsatch Mountains, and passes around the northern end of the Great Lake; it then follows the valley of the Humboldt for 300 miles towards California. In approaching Salt Lake, it is evident that the railway has to cross two dividing ridges at least: 1st, the *true* rim of the basin, and 2nd, the *false* rim, or the ridge lying between Bear River and the lake. This ridge really consists of the lofty western range of the Wahsatch, and would have proved almost an insurmountable barrier, had not another tributary of the lake cut its way through it, forming Echo and Weber Cañons.

The Colorado Basin is separated from that of the Rio Grande and the Mississippi, on the east, by the continental divide of the Rocky Mountains, and from the drainage of the Laguna de Guzman by an almost imperceptible divide, which crosses the level Madre Plateau from the south-eastern extremity of the Burro Mountains into the mountains of Mexico. Thence the divide runs in a westerly course, sometimes in Mexican, and sometimes in American territory, along the boundary line, separating the Gila branches of the Colorado from the streams of Northern Sonora. We see, then, that the Colorado Basin forms a large triangle, limited, on the east, by the continental divide of the Rocky Mountains; on the south, by the high lands about the Mexican boundary line; and on the north-west by the Wahsatch Mountains.

In the northern angle, almost reaching the 44th parallel,

rise the waters of Green River. From the western slopes of the "Summit Plateau" of the Rocky Mountains, further to the southward, collect the heads of Grand River. These unite about twenty miles below the crossings of the old Spanish trail from Los Angelos to Abiquiu, about lat. 37° 30″, long. 111°, and form the Rio Colorado of the West. A fine stream, the Rio San Juan, enters from the east, and about lat. 26° 15″, and long. 113° (Ives' Rep.), the next great tributary pours its waters into the Rio Colorado; this is the Flax River, or Colorado Chiquito (Little Colorado); and, lastly, the Rio Gila, which drains all the southern half of Arizona, enters the main stream at Fort Yuma, sixty miles above its mouth.

In the course of the following pages the reader will, in imagination, cross the Colorado Basin at three different points:—

On the 32nd	parallel,	in the Basin of	Rio Gila.
On the 35th	,,	,,	Colorado Chiquito.
On the 41st	,,	,,	Green River.

In my brief description of the general features of this wonderful country, I shall constantly quote the authority of Dr. J. S. Newberry, who examined, with the greatest ability, that section which is most interesting to us, from its proximity to the proposed line of railway, to the surveying parties for which we were attached.

In 1857-8 Lieutenant Joseph C. Ives, under the authority of the United States Government, made an exploration of the Rio Colorado from the Gulf of California to the head of navigation, 530 miles by water, from the mouth. His party then left the stream, and crossed the continent by land, traversing the country between the 35th parallel and the Colorado Chiquito, and striking the Big Cañon of the

Colorado at two points on the route. Dr. Newberry was the geologist of this expedition, an account of which was published by authority of Congress in 1861. This volume gives the most perfect account of an exploration scientifically conducted that I have ever met with; but, like many other valuable documents published by authority of the United States Senate, it is not for sale, but, having been distributed promiscuously when published to members of the Legislature, whether interested in the subject or not, it can now only be obtained here and there, at second-hand book-stalls, or at library auctions in the States.

The geologists of our parties, Dr. Le Conte and Dr. Parry, fully endorse the conclusions given to the public by Dr. Newberry in his Report, while many of the predictions of that distinguished geologist have since been verified.

The entire Colorado Basin consists of a series of table-lands, piled up one above the other, and covering the whole country. In elevation they vary from 4,000 to 7,000 feet, and reach, in some places, a height of 8,000 feet above the sea. They succeed each other in a series of steps, which generally present abrupt and wall-like edges, the more recent stratum occupying the highest portion of the plateau.

Complete barrenness is the rule, fertility the rare exception; scarcely any vegetation, save the Artemisian scrub, is to be found between the 36th and 42nd parallels; the earth, for the most part, is bare and naked, showing the wear and tear of ages, the erosion of the primeval ocean, and the cracks and fissures of the more recent water-courses.

Whence, we may ask, did the material come from, of which these table-lands are composed?

To what cause is due the Mesa, or Table-land feature of this country?

How are Cañons formed, and what physical conditions are necessary to their formation?

In answer to the first of these questions, Dr. Newberry writes as follows:—

"The question of the origin of the sediments composing the stratified rocks of the table-lands of the Colorado can scarcely be intelligently discussed till we know more than we now do of the geology of a large area lying north of the Colorado, and of the broad and compound belt of mountains, which we have covered by a single name (Rocky Mountains), but which, when carefully studied, will probably not be found to form a geological unity.

"This much, however, we can fairly infer from the observations already made on the geological structure of the Far West, viz., that the outlines of the North American continent were approximately marked out from the earliest Palæozoic times, not simply by areas of shallower water in an almost boundless ocean, but by groups of islands, and broad continental surfaces of dry land. Since the erosion of rocks is always sub-aërial, or at least never takes place more than 40 feet below the ocean surface, it follows, that to form the stratified rocks of only that portion of the great central plateau which borders the Colorado, an island 300 miles in diameter, and at least 6,000 feet high—or, what is more probable, a continent of six times that area, and 1,000 feet high—was worn down by the action of waves and rains, and, in the form of sediments, sand, gravel, clay, or lime, deposited on the sea bottom.

"When we reflect that, with the exception of narrow wedges of eruptive material in the mountains, an area, having on the 36th parallel, the breadth of the entire distance between the great bend of the Colorado and the Mississippi (1,200

miles), and a great, though yet unmeasured, extension north and south, is occupied by several thousand feet of Palæozoic and secondary strata, we must conclude that these sediments have not been derived from the erosion of immerged surfaces east of the Mississippi, but were *here* formed by the incessant action of the Pacific waves on shores that, perhaps for hundreds of miles, succumbed to their power, and by broad and rapid rivers, which flowed from the mountains, and through the fertile valleys of a primeval Atlantis."

These many thousand feet of sedimentary strata were converted into dry land by the gradual upheaval of the Plutonic rocks upon which they were deposited. Generally, they were raised with but little disturbance of their original positions; still, districts, or rather lines, of more powerful upheavals can be traced across the country by the increased height of the table-lands, while here and there more recent volcanic forces have thrust huge masses of igneous rock up through the sedimentary crust, forming mountains more or less isolated, and of great beauty, which contrast strangely with the eroded mesa-lands amongst which they rise. Such are the San Francisco Mountains, Mount Taylor, and Bill Williams Mountains—all now extinct volcanoes.

The thousand springs of Green and Grand rivers which start from an elevation of from 10,000 to 12,000 feet, form cañons in the mountain districts only when some unusual obstacle bars their course. In the mountains which give them birth, frequent rains have washed out sloping valleys, and the primitive rocks have generally succeeded in resisting, to a great extent, their erosive action.

Further from their sources, beyond the influence of the mountain rains, these two rivers and their tributaries, in their passage over the table-lands of the great central plateau, have,

by causes which shall be explained afterwards, cut their way through them in channels, which deepen continually as they advance, and also present fewer and fewer open valleys as they progress, to break the narrow and sunless perpendicularity of their gigantic walls, until, in the case of the Colorado, this penetrative tendency culminates in a gorge or cañon, from 3,000 to 6,000 feet in depth, which, for at least 500 miles, is totally inaccessible from above.

We may, I think, conclude almost with certainty that, at some remote period during the present epoch, the lofty table-lands, through which these rivers have cleft their way, had a much lower level than at the present time. Probably the "Great Basin Region" lying to the westward had not emerged from the Pacific Ocean when these streams were wearing through the first hundred feet of the gorges which now enclose them. The upheaval of the table-lands was gradual; and the forces which raised them were very unevenly exerted over all that vast plain—for it was originally a plain—lying between the Rocky Mountains and the Sierra Nevada. Wherever it happened that a perennial stream flowed over a plateau in process of upheaval, it wore its way deeper and deeper into the uprising strata; and as the rainfall over the plateau was scant, the sides of the fissure thus formed retained their perpendicularity almost intact. The absence of glacial action in so low a latitude may also have assisted this result.

The plateau of the Colorado—that is, the district through which this river runs for 5° of latitude—has been raised to an average elevation of 7,000 feet. It extends in a N.N.W. direction, from a point south-east of the San Francisco Mountains, across the Colorado into Utah, and includes a portion of the country traversed by Grand and Green rivers,

before they unite to form the Rio Colorado, as well as a more considerable part of that crossed by the Colorado Chiquito and the Rio San Juan in the latter part of their course.

"Over this plateau," says Dr. Newberry, "the Rio Colorado formerly flowed for at least 500 miles of its course; but in the lapse of ages its rapid current has cut its bed down through all the sedimentary strata, and several hundred feet into the granite base on which they rest.

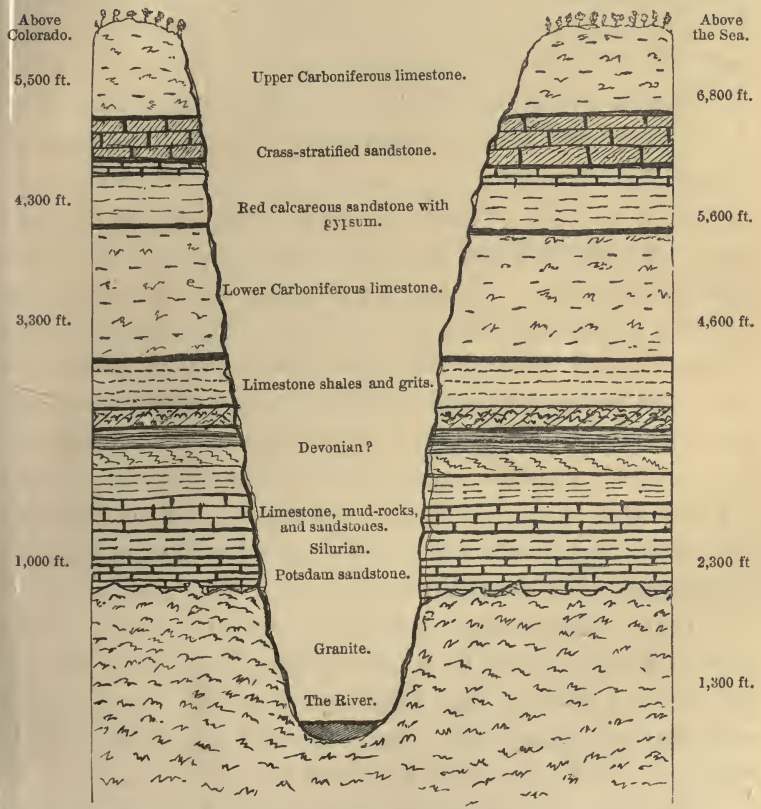
"For 300 miles the cut edges of the table-lands rise abruptly, often perpendicularly, from the water's edge, forming walls from 3,000 feet to over a mile in height. This is the Great Cañon of the Colorado—the most magnificent gorge, as well as the grandest geological section, of which we have any knowledge."

"That portion of the table-lands lying between the mouth of the Virgen and the Little Colorado is composed of over 4,000 feet of sedimentary rocks, representing the Silurian, Devonian, and Carboniferous epochs."

Since Lieutenant Ives' expedition in 1857-8, no attempt has been made to throw any further light upon the structure or geography of this wondrous gorge. It chanced, however, that whilst our parties were conducting their surveys along the Colorado Chiquito, an unfortunate prospector, named James White, was actually passing through the entire length of this chasm upon a simple raft of cotton-wood. As a full account of this hazardous and thrilling adventure will be found elsewhere, I need not here make any further allusion to it.

Between the Colorado Plateau—through which the Little Colorado also cuts its way to join the main stream, like Grand and Green rivers, in a lofty-sided cañon of its own—and the Moquis country (another very elevated table-land),

an elongated basin extends from the Mogollon Mountains north-westward into Utah. As variegated marls here come to the surface, much of this wide trough has received the name of the "Painted Desert." Through a great part of



Section of the Cañon of the Colorado on the High Mesa west of the Little Colorado (by J. S. Newberry, M.D.).

this depression the Colorado Chiquito flows, with open banks, through fertile bottom-land of considerable extent, until it enters the Colorado Plateau.

To the north-west the country again rises step by step, mesa

upon mesa; and upon the edges of several of these latter may be found those interesting fortified towns—the pueblos of the Moquis Indians.

When Lieutenant Ives' party visited these regions, they tried to explore the country to the north-east, but want of water and extreme barrenness compelled them to return, and continue their journey eastward by Fort Defiance into the Rio Grande valley, and thence across the plains. Dr. Newberry thus speaks of the Moquis country and the districts beyond:—

"This mesa is, geologically and physically, the highest which we actually passed over on our route west of the Rocky Mountains. Near Fort Defiance its summit has an altitude of nearly 8,000 feet. At the Moquis villages, the strata forming the table-lands begin to rise towards the east; and near Fort Defiance, where the mesa country reaches 8,000 feet, they plainly show the disturbing influence of the most westerly axis of elevation of the Rocky Mountain system. Further east, to the Rio Grande and beyond it, they are much dislocated, and finally lose their distinctive character in the intricacies of the mountain ranges.

"In the interval between Fort Defiance and the Rio Grande rises a great volcanic mountain, Mount Taylor (San Mateo), which, like that of San Francisco, has burst through the sedimentary strata, and poured over them floods of lava, which are as fresh as though ejected but yesterday.

"The highest of the table-lands which we passed over was formed of Lower Cretaceous strata; and yet another must be added to the series before my description of them will be complete.

"On our route across the continent, we passed somewhat south of the centre of what we may, perhaps, properly call the

Vincent Brooks Day & Son, lith.

THE COLORADO PLATEAU, LOOKING OVER THE GREAT CAÑON.

basin of the Upper Colorado, and did not, therefore, mount quite to the summit of its geological series. Going north from the Moquis villages on the Lower Cretaceous mesa, our progress was arrested by a want of water, the surface being everywhere cut by deep cañons, by which it is drained to excess, every rain-drop which falls finding its way immediately into the bottom of these ravines, where it is hurried off to the far deeper cañons of the Colorado and its larger tributaries. Before we turned back, however, we had approached nearly to the base of a wall, rising abruptly from the mesa in which we stood to the height of more than 1,000 feet. This wall was as white as chalk, and reflected the sunlight like a bank of snow. It is evidently the edge of another and a higher plateau, and apparently reaches to the Rio Colorado, where it caps the high mesa, forming part of the stupendous mural faces presented towards the south and west, which were distinctly visible when we had receded from them to the distance of one hundred miles.

"What the character of this upper mesa is I had no means of determining at that time, and even now there may be some question about it; but I have scarcely a doubt that it is composed of the Upper Cretaceous strata, the equivalents of the true chalk of Europe." This has not yet been recognised by any geologist on the American Continent.*

From what has been said, we can now answer the question —How are cañons formed, and what are the physical conditions necessary for their formation?

Cañons are usually formed by the action of water only, unaided by volcanic force, which is often erroneously said to be the primary cause of the so-called fissures and cracks through which the waters flow.

* Vessels are ballasted with true chalk from London to New York.

The physical conditions are,—1st. A dry climate, in which even periodical rains do not fall to any considerable amount; 2nd. The passage of never-failing streams from their distant and exterior sources through this dry country; 3rd. It is requisite that the surface strata should be of such a nature as easily to yield to the action of the current; but when once a groove has been furrowed, and the water channel definitely fixed, it does not appear to matter of what the underlying rocks are composed, since the unceasing attrition of ages has, in some instances, succeeded in cutting through 1,000 feet of the hardest granite; 4th. It is requisite that the fall of the land should be sufficiently great to insure a rapid current.

It is impossible for a country in which cañons abound to be anything but sterile and utterly worthless, for the deep cuttings everywhere drain it to the utmost; and the waters, buried deep in the bowels of the earth, lie far beyond the reach of animal or vegetable life on the surface.

In answer to the question, To what causes are due the mesa, or table-land, features of this country? I quote Dr. Newberry in his own words:—

"Like the great cañons of the Colorado, the broad valleys, bounded by high and perpendicular walls, belong to a vast system of erosion, and are wholly due to the action of water. Probably nowhere in the world has the action of this agent produced results so surprising, both as regards their magnitude and their peculiar character. It is not at all strange that a cause which has given, to what was once an immense plain, underlaid by thousands of feet of sedimentary rocks, conformable throughout, a topographical character more complicated than that of any mountain chain; which has made much of it absolutely impassable to man, or any animal but the winged

orders of creation, should be regarded as something out of the common course of nature. Hence the first and most plausible explanation of the striking surface features of this region is to refer them to that embodiment of resistless power—the sword which cuts so many geological knots—volcanic force.

"The great cañon of the Colorado would be considered a vast fissure or rent in the earth's crust, and the abrupt termination of the steppes of the table-lands as marking lines of displacement. This theory, though so plausible, and so entirely adequate to explain all the striking phenomena, lacks a single requisite to acceptance, and that is *truth.*

"Aside from the slight local disturbance of the sedimentary rocks, about the San Francisco mountain—from the spurs of the Rocky Mountains, near Fort Defiance on the east, to those of the Cerbas and Aztec mountains on the west—the strata of the table-lands are as entirely unbroken as when deposited. Having this fact constantly in mind, and examining with all possible care the structure of the great cañons which we entered, I everywhere found evidence of the exclusive action of water in their formation. The opposite sides of the deepest chasm showed perfect correspondence of stratification, conforming to the general dip, and nowhere was there displacement; the bottom rock, so often dry and bare, was, perhaps, deeply eroded, but continuous from side to side, a portion of the yet undivided series lying below. The mesa walls should be included in the same category with those of the cañons—sometimes, indeed, they are but cañons, miles in breadth.

"The origin of the series of escarpments which are met with in crossing the table-lands from west to east is, I think, dependent upon very general, but yet appreciable causes, to which I can here, however, but briefly allude.

"From the Cerbas Mountains to the base of the high mesa,* the strata composing the high table-lands have a north-easterly dip of about 100 feet to the mile. There they rise, but soon dip again into the valley of the Little Colorado, their strike being nearly at right angles with the course of the great draining stream, the Colorado. By a glance at the map, it will be seen that the watershed, made up by the San Francisco group, the Mogollon, and the spurs of the Rocky Mountains, which throws the water into the Colorado over the table-lands from the south, south-east, and east, forms a semi-circle imperfectly parallel with the course of the Colorado, into which the drainage from the different parts of this semi-circle falls nearly at right angles. The flow of waters from the mountains has therefore been here, as elsewhere along the strike of the strata, north and north-west from the San Francisco and Mogollon mountains on the western side of the basin. The legitimate and inevitable effect of this combination of causes has been to erode the *softer* down to the *harder* strata, forming broad valleys, bounded on the west by the denuded slope of the harder rocks; on the east by the abrupt wall of the softer strata, most precipitous when capped by harder material. The erosion, for the most part produced by water flowing from a distant source, has taken place on the harder material at the bottom only of each trough, and thus has preserved the abruptness of the wall."†

Leaving the weird, worthless regions north of the 36th parallel, let us glance for a moment at those forming Central Arizona, lying between the Colorado Chiquito and the Rio

* That mesa, N.E. of Fort Defiance, supposed to consist of true chalk.

† I have quoted Dr. Newberry at some length, because I feel that great credit is due to him for so clearly laying down those principles which, when thoroughly grasped by the Western traveller, enable him to read the face of nature intelligently, and to account for much of what is very striking, in a manner satisfactory to himself, even though he may not be versed in geology.

Gila. Nearly all this region has been greatly disturbed by innumerable ranges of mountains, more or less volcanic, while the surface is covered with the products of volcanoes now extinct, and with the drift washed from the mountain sides.

Between the head-waters of the Rio Gila and the Colorado Chiquito is a very elevated tract of country, chiefly occupied by the various ranges known as the Mogollon Mountains, which shed their waters in a southern direction to form the Rio Gila, and in a north and north-western direction towards the Colorado Chiquito. The hostile Indians, the Apaches, of these regions have, up to the present time, so kept the white man at bay that no explorations have been made through them; and we know nothing of the country, except from the few daring prospectors whom thirst for gold has led to risk their lives in its pursuit. The reports of these men, who are wonderfully shrewd and reliable, describe the land as being very beautiful and of great fertility. Forests of noble pine cover large portions of the mountains, enclosing well-watered parks and valleys of considerable extent, clothed with luxuriant Grama grass; and although much of it is wild and barren, cut up by ravines and impassable barriers, still the signs of mineral wealth everywhere abound, and predict a prosperous future for this section of country.

The moisture from the Gulf of Mexico has no great obstacle to bar its way between the Texan coast and these regions, and to cause its precipitation before arriving at them; for the "Summit Plateau" in this latitude has sloped away, and the Rocky Mountain chains have ceased to be conspicuous, so that the rainfall about the mountains of Central Arizona is far greater than the travellers who have passed north, or, as is more usually the case, south of them, in the more level though more arid districts, are aware of.

The next belt of mountain ranges, also trending north-west

and south-east, is that which has the Aztec Mountains, Bill Williams Mountain, and perhaps the San Francisco peaks, to mark its northern extremity. It passes obliquely across Arizona, cresting the San Francisco Plateau, forming the Pina-leño Mountains, north and south of the Rio Gila; the Chiricahui Mountains, their continuation; the Sierra Calitro and Sierra de Santa Catarina, parallel ranges; then, crossing the boundary line into Mexico, the mountain sources of the San Pedro and Santa Cruz rivers form part of the same belt of upheaval. At last it is merged into the Sierra Madre, which caps the plateau of Mexico. If the Sierra Madre, or main mountain chain of Mexico proper, be a continuation of any northerly chain, it is of that which I have just mentioned, and not, as is commonly but erroneously supposed, of the Rocky Mountains, which undoubtedly lose themselves at least 2° to the north-east in the broad plateau of New Mexico, commonly known as the Plateau of the Sierra Madre.

When a range of mountains forms the main continental water-parting, the Mexicans of the locality very commonly call it the "Sierra Madre," or Mother Mountain; thus it happens that there are several Sierra Madres, which belong not only to the actual Rocky Mountain system, north of the 34th parallel, but also rise from the highest plateaux of Mexico proper. And while referring to this distinction, I may add that I have thought it desirable to carry the same idea further, and leave out the word *Sierra* in the name given to the great plateau of Southern New Mexico, thus calling it simply the Madre (or Mother) Plateau, because the continental divide actually crosses it, although no range of mountains, or in fact any perceptible inequality of surface, marks the water-parting.

North of the Rio Gila, the description of the Mogollon mountain belt applies with equal truth to these ranges, except

that portions of country amongst the latter have been settled up, partly by Mexicans, the remnant of the Spanish occupation of the sixteenth and seventeenth centuries, and partly by Americans, since the annexation in 1848. Extensive mining districts have been discovered; mines have been opened and found to yield abundantly; herdsmen have commenced raising stock; and farmers have found that crops could be grown, even without irrigation, in many places around Prescott (the capital), situated in the northern part of this belt of mountains. But the wild Indians of these regions are waging, as they have been waging for ages, unceasing war against the cultivator of the soil, whether he be Aztec, Mexican, or Anglo-Saxon; and, although vastly inferior beings in every respect, these savages are even now successfully stamping out the efforts of the white men to inhabit the country. The Apaches, who have ever lived by the plunder of their neighbours, are at this moment driving back the tide of emigration in Central and Southern Arizona; and neither the settlers nor the military dispersed throughout the country are able to contend successfully against them. Is the country always to remain a wilderness?

Wherever we or our parties have been we have found the whole country strewn with the ruins of villages, irrigating canals, and pottery belonging to a populous race now extinct.

The Indians of the Moquis villages, which have been referred to; the Indians of the Pima villages, who cultivate large tracts of land in the Rio Gila bottoms; and the wandering tribe, the Papagos, who inhabit a large tract of country, almost a desert, south of that river, are the only civilised Indians now to be found in Arizona. The fertile valleys of these regions once supported a very considerable population. Have the Apaches overpowered them, or have recent physical

changes in the country led to their disappearance? There is much to be said in favour of either hypothesis; but we will leave the discussion of them until we have travelled through the country and made the acquaintance of its present inhabitants.

Between the comparatively fertile belt of mountainous country which we have been considering, and the Rio Colorado, lies a district less elevated, and becoming very dry and arid as we pass westward. It is, however, covered more or less with short ranges of bare, volcanic hills, rich in minerals, gold and silver veins, which are attracting the attention of miners from California more and more every year. At last the Colorado Desert is itself reached. This river, having traversed the lofty plateau in almost a due westerly course, takes a great bend to the south, and emerging from its cañoned table-lands into the lower country, meanders through broad and sultry valleys, which become more and more parched and sterile as they near the head of the Gulf of California.

The Rio Gila does much the same thing: it cuts through the Pina-leño Mountains north of Camp Grant by means of a succession of cañons. Its bottom-lands are extensive and fertile *above* these cañons for a distance which at present is not ascertained, and *below* them for about fifty miles in the Pima country. But, further west, it enters the sterile region known as the Gila Desert, the continuation northward of the Great Sonora Desert, and passes through it for the remaining 150 miles of its course until it reaches the Colorado.

This completes our rapid survey of the Colorado Basin. We will now pass over the Wahsatch Mountains, forming its western boundary, and take a bird's-eye view of the country beyond.

IV.

GENERAL FEATURES OF THE GREAT BASIN.

Shape, Boundaries, and Elevations of the so-called "Great Basin."—The Region is covered throughout with short Volcanic Mountain Ranges.—The Soil.—The Drainage: its Peculiarities.—The term "Great Basin" is a misnomer.—Lakes and Rivers.—Oases in the Desert.—Mormon Settlements.—Mineral Wealth.—The Comstock Lode.

Between the Wahsatch Mountains and the Sierra Nevada, extending northward beyond the 42nd parallel, and southward into Lower California, lies a district considerably larger than the kingdom of France, which goes by the name of the *Great Basin*. It has received the name simply from the fact that none of its rivers enter the sea. It is not an appropriate name, however, for it embodies a glaring topographical error.

The Colorado Basin represents in shape a triangle, whose apex lies to the north or north-east; the Great Basin (we must retain the usual name) is also shaped like a triangle, whose apex points to the south or south-west. From this apex at the Gulf of California, the ground rises from the level of tide-water to 5,000 feet, or thereabouts, in Central Nevada; and this is about the general level of the whole country between the Sierra Nevada and the Wahsatch Mountains in the broad part of the Great Basin. North of the Humboldt, where the drainage divides, this elevation is exceeded, and there are innumerable local depressions which scarcely reach 4,000 feet; but north of the 37th parallel there are few places below this elevation.

There is great uniformity throughout the whole of the country; the surface is covered everywhere with short ranges of volcanic mountains of recent origin. Their general trend seems to be influenced mostly by their relative positions with respect to the great ranges on either side of them—the Sierra Nevada and the Wahsatch Mountains; for the tendency is to run parallel to whichever of these they are nearer to, and in the centre of the basin the general direction is north and south. In crossing the Great Basin, from Donner Pass in the Sierra Nevada to the Wahsatch range at Salt Lake, we passed over no fewer than twenty of these ranges, the basin at that latitude being 700 miles across. On the 35th parallel, nine ranges were crossed; on the 32nd, a less number; as in the one case the distance across was less than 300 miles, and in the other under 200.

The ranges consist chiefly of volcanic tufa, trachytic breccia, trachyte, and diversely-coloured porphyry, all more or less decomposed. They are mountains in miniature, beautiful in outline, variegated by many-tinted rocks, and usually perfectly bare of trees, or even shrubs. They show on their sides the effect of rains and water to an enormous extent, for the volcanic rocks of which they consist are easily decomposed by the elements, and then washed away. The ranges may in former times have been very long and continuous; but it is evident that, ever since their formation, water has been cutting them through, washing them down, and filling up the valleys with drift from their sides.

The average width of the ranges would be about twelve miles, the height above the general level of the basin from 1,000 to 4,000 feet. The valleys are mostly about twenty miles wide, and often of great length; but more frequently they are limited above and below by transverse ranges, which,

however, are sometimes washed down to very inconsiderable dimensions, so as to form a number of separate little basins. The well-preserved water-marks which are everywhere visible indicate extreme dryness, upon which dryness most of the peculiar characteristics of the country depends. Artemisian scrub (sedge-brush) and grease-wood* alone spring from the dry, parched earth, except where some stream of unusual persistence supports a row of cotton-wood trees † and a few acres of grass along its edges. From the decomposition of volcanic rocks, the soil in its ingredients is very rich, and, where irrigation can be supplied, yields most abundant crops. There are broad, level districts, however, called by the settlers "alkali flats," which are covered with salts, usually nitrate of soda, and are thereby rendered perfectly barren. These white, glistening sheets, in the dry, unsteady atmosphere of the desert, form the most tantalising mirages to which a thirsty traveller could be exposed. At certain seasons they are covered for a short time with a thin coating of water—the local drainage of the surrounding district—which is soon dissipated by the scorching sun.

The plateaux of the basin-region were undoubtedly the last portions of the Western Continent raised from the sea—the last from which the Gulf of California retired. Even now subterranean fires are active, and the process of gradual upheaval may still be going on. Earthquakes are frequent; mud volcanoes are still to be found in places; huge cracks in the earth's surface have occurred within the memory of living men; craters, recently active, dot the whole district; and hot springs are so numerous that I have counted fifty-two jets of steam issuing from the ground like pillars of smoke in one valley alone.

* *Obione canescens.* † *Populus angustifolia.*

When the Great Basin came into existence, or rather emerged from the water, there were dry lands and mountains east, west, and north of it, shutting out from it the moisture of the Pacific Ocean, as well as any that might travel thither from the far-off Gulf of Mexico. The climate may be considered to have been then not unlike that of the present time, so that the rain-fall was far less, even in the new-born "Basin Region," than it was over the Colorado Basin in its primeval state, which was then washed by a broad Pacific Ocean. The effect of these climatic peculiarities was that a sufficient quantity of rain never fell upon the "Basin Region" to form a complete system of drainage from the highest lands down to the sea.

We can easily conceive that, in the formation of an extensive drainage system, the little primitive streams form lakes at the first serious obstacle met with in their course. These lakes, when full to overflowing, find at length some outlet, and wear the channel of exit deeper and deeper, until the obstacle is overcome, and the lake drained. Thus lake after lake is formed, and disappears as each succeeding obstruction is cut through, until the independent streams, having sought the lowest levels of the country, unite their waters into a single channel, and so pass into the sea. There is nothing whatever in the physical construction of the Great Basin to have prevented the formation of one great river, emptying into the Gulf of California, either as an independent stream or as a tributary of the Rio Colorado. It is not because the Great Basin is really a complete basin without an outlet, or with a rim presenting an insurmountable barrier to the drainage, that its waters do not escape to the sea, but rather because it is not a single basin at all, but a collection of perhaps hundreds of basins, which have always remained in their primitive isolated

condition, each with its stream and its lake at the end of it, and because the separate streams have never had force enough to break through the barriers which all streams have at first to encounter, and to unite their waters, so as to form a complete drainage system. There is no doubt that formerly the atmosphere was more humid, and that more rain fell, for the remains of fresh-water shells of the present epoch, covering large tracts of desert, prove the existence at one time of lakes much greater in extent than any which can now be found; but instead of being filled to overflowing, and breaking through their barriers to the sea, these lakes lost more water by evaporation and percolation than their tributary streams supplied, and thus were gradually dried up.

The drainage, then, of the Great Basin is in a primitive stage of existence, and will probably always remain so. Wherever in this region there are lofty mountains, there we are pretty certain to find a lake proportionately great. If the lake has no outlet, it of necessity contains salt water, which becomes salter and salter as time advances, from the concentration, by means of evaporation, of the salts washed into it from the decomposed rocks of the mountains. But when the lake has an outlet, the water is, as usual, fresh. Great Salt Lake is an example of the former class; Utah Lake of the latter. Most of the lakes, however, are not permanent; they form broad sheets of water after rain, but are perfectly dry and barren during the greater part of the year. They vary greatly in elevation and size. Great Salt Lake exceeds 4,000 feet above the level of the sea; Sevier, 5,000; Lake Tahoe, 6,250; Monro Lake, 6,454; Pyramid, 3,940; Williamson's, 2,388; Morongo Sink, 1,500; Mojave Sink, 1,000; and Perry Basin, 530.

Two depressions, at least, are below the level of the

sea: the one is a large saline flat, situated a little north of the Mexican boundary line, which is usually called Soda Lake. It is about 70 feet below tide-water, and although nearly always perfectly dry, a long dyke, known as Hardy's Colorado or New River, flows through the desert towards it when the Great Colorado is flooded. Leaving the latter stream about half-way between Fort Yuma and its mouth, it receives the back-water of the Colorado, flows northward across the boundary line, and becomes lost in the desert before reaching Soda Lake. If it had sufficient volume, this large depression would become filled with fresh water—a very desirable result.

The most wonderful depression, however, is Death Valley, the sink of the Amargoza, which is 175 feet below the sea. Although this depression is an arid desert, an enormous area of country drains into it, extending from lat. 37° to the San Barnardino Mountains, from which the Mojave River rises, and comprising not less than 30,000 square miles. At first sight it might appear that the existence of these depressions rather contradicted what I have said as to the causes which have produced the hydrographic peculiarities of this "Basin Region." But a glance at the Colorado Basin at once, I think, decides the question. Let us suppose that a humid climate had poured abundant rains upon the table-land, 1,000 feet high, which separates Death Valley from the low lands at the head of the Gulf. A fine sheet of water would cover Death Valley, and this lake would have had an outlet to the sea through the opposing table-land. If 7,000 feet of table-land yielded to the waters of the Rio Colorado, surely 1,000 feet of similar formation would not prevent the overflow of a large lake from reaching the coast.

Great Salt Lake, the largest in the Great Basin, is about

sixty miles long, by ten miles broad—a very small sheet of water compared with the fresh-water lakes of the Eastern States, or those of Central Africa. But there is abundant evidence all around it to prove that in former times it covered an area twice, if not thrice, as great as it occupies at present. Of late years this lake has steadily been rising; so steadily that, if this rise continues, thousands of acres which are now lake-shore will soon be re-covered with water. It is a question of considerable interest whether the large tracts of land now irrigated by the Mormons have not caused this result, by considerably extending the area of evaporating surface, and increasing, as a consequence, the yearly rain-fall.

The largest stream in the Great Basin is the Humboldt, which is more than 500 miles long, and passes from east to west across the entire district, at its northern part, before emptying itself into Humboldt Lake. The valley of this river is said to be generally so sandy as to be worthless even if irrigated; but this conclusion may be premature, for many of the lands most productive when irrigated, look sandy and utterly worthless in their parched and wild condition. Much of the Rio Grande valley bears testimony to the truth of this assertion. Reese River fertilises a narrow valley of about 100 miles in length, near the centre of the basin, in which are several agricultural settlements. The same may be said of the Tuckee, Carson River, Walker River, and some others, which flow from the eastern slopes of the Sierra Nevada into lakes in the desert. Along these, and the western slopes of the Wahsatch Mountains, a great many spots are favoured with enough running water to support a considerable population; and, in fact, all over the Great Basin the most tempting localities are being colonised and settled up by little

communities of Mormons from Salt Lake City, who are all agriculturists, and nothing else.

If, however, the Great Basin had only these attractions to hold out to emigrants, it would be a region of as little interest as any on the globe; but amongst these barren, monotonous ranges lie the vast deposits of silver ore which, since the discovery of the Comstock lode, have been found to be scattered throughout the entire region. The lode just named has yielded, in the four years ending April 1st, 1866, 51,380,500 dollars, or upwards of £11,000,000 sterling. Its present annual yield is about 600,000 pounds avoirdupois of silver (containing more or less gold), worth about £4,000,000 sterling, a yield which exceeds the present yearly total of all the silver mines in Mexico. One mine company alone—the Savage—during 1867 paid in dividends a larger sum than that derived from all the metallic mines of England and Wales put together. Any day we may hear of another "Veta Madre" (as the Mexicans call one of these wide rich veins) being discovered, for by far the greater part of the basin is as yet quite unknown, even to the indefatigable prospectors, who brave all privations in the search for the precious metals. Mr. Ross Brown, in his last Report on mining operations in the districts west of the Mississippi, gives the total yields of the gold-fields of California, for the year 1867, at the small sum of 25,000,000 dollars, while that of Nevada is 20,000,000 dollars, of which the Comstock lode furnished about 14,500,000 dollars, thus leaving the large amount of over 5,000,000 dollars as the yield of the newly-discovered districts.

Enough, however, has been said to give a general idea of the Great Basin, so we shall leave the further consideration of this subject, and of the probable results to be expected

when two great railways are completed across it, to be more fully discussed in subsequent pages.

The short reference already made in this introduction to the drainage of California, and to the mountain ranges of that State, will suffice to give a general idea of "how the land lies" between the Sierra Nevada and the Pacific coast.

PART I.

FROM THE MISSISSIPPI RIVER TO THE RIO GRANDE DEL NORTE.

FROM THE MISSISSIPPI RIVER TO THE RIO GRANDE DEL NORTE.

CHAPTER I.

THE CAPITAL OF THE WEST.

Arrival at St. Louis.—The Mississippi.—History of St. Louis from its first settlement in 1764.—Its present prosperity and future prospects.—Natural resources of Missouri.—Depression caused by the War.—Pernicious effects of Slavery.—St. Louis the Capital of Missouri.—St. Louis the Centre of Commerce throughout the Mississippi Valley.—St. Louis the most natural spot for the Federal Capital.

The moment I felt the train slackening its speed, as it neared St. Louis, I threw open the window and looked steadily ahead, to catch a first glimpse of the Mississippi. It separates the railway terminus from the city; and, as the line runs close to the river for a short distance, a fine view is gained of its grand proportions. It is marred considerably by the total absence either of large timber or good houses on the eastern bank; but the opposite side, marked by the broad bustling quay, and a string of many-storied river boats, two miles in length,—the dense piles of warehouses and the rest of the city built on a higher level, forming the background,—is perfect as a picture of American progress. On leaving the train, on the eastern bank, you find half-a-dozen large omnibuses, drawn by four horses, and the usual accompaniments of hacks and carriages, waiting to receive you. When the omnibuses are

filled, they all start down to the river-bank and drive straight on to the ferry-boat, closely followed by the small fry. The omnibuses and carriages take up one side of the boat, the carts and wagons fill the other; the whistle sounds, and off we go, apparently up stream, but we soon find that the current is carrying us across, and that in reality we only hold our ground against it. It is now that we fully realise the width of the river and the great rapidity of its current.

The St. Louis ferry-boat will soon be a thing of the past, for the foundations of a splendid bridge are already laid. It is, I believe, to be built on arches for some distance on each side, and to be united in the centre by a suspension bridge 600 feet in length, and so lofty that the largest river boats may pass beneath it without lowering their chimneys. This bridge, like that of Niagara, is to combine road and rail, one above the other. Besides this, a tunnel is also in contemplation, which will supply to another section of the city similar advantages.

It would not, I think, be just to St. Louis to leave it behind us without devoting a few lines to its history and future prospects. The capital of the West may be taken as a sample of those large commercial centres of the United States whose growth has been so marvellous.

Not more than a century ago, in the summer of 1763, Pierre Lascede, with a party of French trappers and traders, started up the Mississippi, from New Orleans, for the purpose of establishing a trading-post at the junction of the two great rivers—the Mississippi and the Missouri. After five months' travel, their destination was reached, but the low lands and treacherous banks at the junction did not satisfy them; so they retraced their steps to a rising ground which they had passed twenty miles below on the western bank; and here,

on the 15th of February, 1764, the birthday of Louis XV., they landed and established a permanent settlement. Like most French colonists on the American continent, these men managed to live in peace with the Indians. Instead of trying to "improve" them off the earth, they did not scruple to unite with them in social bonds, which resulted in the rising generation being mostly half-breeds. The trader's hut was little better than a wigwam, and he himself became after a time not so far removed from a red-skin.

The same year in which the colony was founded, all the country east of the Mississippi came into the hands of the English; and several French settlers, who did not relish a change of nationality, joined the little colony at St. Louis. No sooner, however, had they arrived, than fresh tidings came that all the French possessions west of the great river had been ceded by Louis XV. to Spain; and thus St. Louis became an outpost of Spanish Louisiana, and remained so for thirty years. During this period, trade with the Indians, and that alone, caused a gradual increase, more, however, of the wealth than of the population in the settlement; and in 1804, when Spanish Louisiana became part of the United States, the colony scarcely numbered 1,000 inhabitants. What a startling event this must have been for the little community of Frenchmen, squaws, and half-breeds! Freedom of worship and a post-office were at once established; in 1808 there appeared a newspaper; in 1809 a fire company; in 1810 road-masters were established; in 1811 two schools—one French, the other English—and a market were opened; in 1812 the first Mission Fur Company was formed, which revolutionised the entire fur trade; in 1813 lead mining commenced; and in 1815 the first steamboat was seen at St. Louis. Not content, however, with these innovations, the

Anglo-Saxon intruders set to work at that early day to Philadelphianise the "city," or rather to reproduce Philadelphia, then their model of perfection, on the banks of the Mississippi.

Five years after the era of steamboat navigation, the question of slavery came before the people of St. Louis, and they, after prolonged deliberation, voted in favour of it; by which act they saddled upon the whole of Missouri an institution which was thoroughly unsuited to the State, situated as it is in so northern a latitude, and containing within itself such varied sources of wealth.

From 1820 to 1830 the tide of emigration gradually crept westward, until at last, between 1830 and '35, the discovery of the enormous agricultural value of the prairie regions, which occupy so large a portion of the eastern part of the Mississippi basin, caused the wave of emigration to pass like a flood over all that country. Chicago was unborn, and the great north-west was almost unknown when St. Louis became the outlet for the produce of the western prairie farmer. From this epoch her population has rapidly increased, her wooden shanties have been replaced by large buildings of brick and stone, her narrow French streets have become broad avenues, and the merchants of St. Louis have gradually amassed an amount of wealth far greater than those of any other city west of the Alleghany Mountains. Nothing has more forcibly shown how solid the commercial prosperity of St. Louis really is than the wonderful manner in which her inhabitants have withstood the prolonged depression caused by the rebellion. By far the majority of the influential men in the city were Secessionists; still the Republican minority, with the aid of the Germans, who represent a population of 30,000 souls, and assisted occasionally by the central government, defeated all attempts

at carrying the secession ordinance, and thus kept Missouri within the Union. The State, however, being a border State, was swept over and over again by the contending armies; so fiercely, indeed, did the passions of civil strife rage in the breast of the Missourians, that where one party held possession of a district, none of the opposite faction could live therein, all had to leave and seek homes elsewhere. With the country in such a condition for at least the first two-thirds of the war, complete stagnation of trade, and something nearly resembling a state of siege, existed in the city. Yet, notwithstanding this, scarcely a mercantile house of any note "fell through," and nearly all the merchants were able to resume business on their former firm basis immediately after the war had ceased.

The following table shows the gradual growth in population of St. Louis:—

As a trading-post.		As a commercial centre.	
A.D.		A.D.	
1764	120	1830	5,852
1780	687	1840	16,469
1799	925	1850	74,439
1811	1,400	1859	185,587
1820	4,928	1866	204,327
		1867	220,000

What shall we say of the present city? The traveller from the east finds himself at home directly; he knows almost where every house is situated, and can go straight to his destination without asking the way; for the streets, which run parallel to the river, are all named, as in Philadelphia, 1st, 2nd, 3rd, &c., from the quay inland; while the familiar names of Chestnut, Walnut, Spruce, and Pine meet him at every corner, since these avenues (also according to Philadelphian rule) cut the numbered streets at right angles. There are no natural limits to the expansion of the city.

Most of the streets are wide and beautifully paved; the houses are fine, and, until three days before my first arrival, the largest hotel in the States was located here. I only saw its smoking ruins. As the traffic is not of necessity confined to any single thoroughfare, on account of the chess-board regularity of the streets, an air of quiet and repose usually rests upon the city. Signs of a considerable French population are everywhere to be recognised, and that too, not only in the shops and cafés, but about the streets; society also is softened and refined by it, trade is less wild and enthusiastic, pleasure is more sought after and enjoyed. Sunday also wears a characteristic garb, for half the population are Roman Catholics.

Enough, however, has been said of St. Louis past and present. Let us take a glance at the probable future of this city, which for nearly half a century has been trebling its population every ten years.

St. Louis is, in the first place, the commercial capital of Missouri, a State unsurpassed by any of her sisters in the plentitude of her natural resources. The soil throughout almost the entire area of 65,037 square miles * is most fertile and well watered; it consists of alternate tracts of heavily timbered country and prairie land. Some of the finest districts are picturesquely undulating; others consist of the perfectly level bottom-lands of the Mississippi and Missouri. In some counties the rocks are partly of volcanic origin, in others the limestone and carboniferous strata prevail. The composition of the soil being so various, the number of productions is unusually great. Besides the cereals, all of which thrive luxuriously, hemp, tobacco, the grape-vine, sorghum, imphee, and cotton in the south, are among the most

* Area of England and Wales = 58,320 square miles.

important. Forty-five per cent. of the hemp grown in the United States comes from Missouri, the tobacco is equal to that grown in Virginia and Kentucky, and the manufacture of wine is progressing most satisfactorily, both as regards quality and the yearly yield per acre.

As regards the mineral wealth of Missouri, more than one-third of the entire State lies upon a vast coal-field, many veins of which average 15 feet in thickness. Iron of the best quality is very abundant, not below the surface only, but above it; for a few miles from St. Louis there are two mounds, Pilot Knob, 585 feet in height, and Iron Mountain, which covers an area of 500 acres; both of these are solid masses of the richest iron ore. Extensive deposits of lead and copper are also situated in the vicinity, and from these mines short lines of railway carry the coal, iron, lead, and copper to the furnaces and factories of St. Louis. Quite recently, tin has been discovered in large quantities; while zinc, platina, silver, gold, nickel, pipe-clay, marble, granite, and other kinds of building-stone are amongst the mineral productions of different parts of the State.

There can be no question but that slavery has greatly retarded the development of all this natural wealth, for it has, to a great extent, kept out the industrious emigrant of small capital who was willing to farm with his own hands; and it has also acted as a continual damper upon all those sources of industry which are dependent upon skilled labour; so that St. Louis was checked in her manufactures by the same influences which kept back the mining and agricultural interests of the country at large.

Now, however, slavery is no more, and the immense tracts of uncultivated land, which at the termination of the war amounted to at least, 25,000,000 acres, have since been

nearly all taken up, either from the Government under the Homestead Act, or by small purchasers from the original great land-owners. The effect of this influx of small farmers into Missouri is well shown by the corn market receipts. In 1860 (before the war) the corn receipts amounted to 4,250,000 of bushels. In 1863 (during the war) they fell to less than 1,000,000. In 1865 (after the war) they again rose to 3,000,000; and in 1866 they reached the unprecedented amount of 7,233,671 bushels.

There is scarcely an industry which has not made almost as rapid growth. The quantity of machinery and iron goods now manufactured at St. Louis is enormous. The flour trade is probably the largest in the States; next in importance come the sugar refineries; these and many other manufactures are rapidly increasing in numbers and importance, as railway extension and the advance of settlement westward, enlarge year by year the market to be supplied by them.

St. Louis is not, however, the commercial capital of Missouri only, she is also the great trading centre of the Mississippi valley. More than 260 river steamers are employed in her carrying trade; and I have counted sixty of these curious three-storied structures, combining the hotel above and the merchant ship below, lying along the quay. These boats ascend the Mississippi 740 miles, to St. Paul, and descend it to its mouth, 1,212. They go up the Missouri 685 miles to Council Bluff, and traverse the upper part of the river for 1,166 miles farther. The Ohio River takes them to Pittsburgh, 1,195 miles distant, and its branches are navigable still farther up, into the oil regions of Pennsylvania; and although the contemplated canal, which is to connect the waters of the Upper Mississippi with the Great Lakes, is not yet in being, still the navigable portion of the Father of

Waters and his tributaries, representing a total length of 12,000 miles, places St. Louis in communication with every city of importance in the largest river basin on the globe. It cannot be said that man is not striving to make the most of what nature has done for St. Louis. Apart from the many railways which already radiate from the city towards every point in the compass, there is one which is destined, before many years have passed, to unite her with San Francisco on the Pacific coast. When this trans-continental highway is completed we shall not only see the steamer laden with furs from Minnesota, lying by the New Orleans orange boat at the levée of St. Louis, but trains, carrying the silks and teas of China on the one hand, and the choicest products of Europe on the other, shall enter the city from opposite directions, and discharge their freights under the same roof.

There is yet another consideration for the future. Each succeeding year adds so materially to the political influence exercised by the Western, as well as by the Pacific, States in Congress, that a national question of no small interest to St. Louis must soon be brought forward for public consideration. If the great Republic is destined to continue its growth as one nationality, Washington cannot long hold its position as the political centre of the whole country. Apart from its geographical position, there is little doubt but that the theory of arbitrarily choosing a particular spot for the political centre, and of thus isolating the executive and commercial capitals, has not worked well. Abuses have crept into many of the State legislative bodies, if not into Congress itself, which could not have successfully evaded the vigilance of a large number of intelligent lookers-on, who, being of necessity on the spot from interests, setting aside politics, would have watched everything, and have protested publicly against any such

abuses. It is, in fact, far better to follow the natural tendency towards centralization, and to place the seat of Government, whether it be that of a state or nation, in the most convenient and central of its great commercial towns, where energy, talent, and wealth are of necessity to be found; for in such a centre the Government is assuredly most secure.

Where then shall the Federal capital be placed, seeing that Washington is neither a commercial, agricultural, nor geographical centre? From the reasons I have named, it seems more than probable that the final answer will be at St. Louis. Although two-thirds of the territory of the United States lie to the west of the Mississippi, yet this region, taken as a whole, can never support so great a population as the remaining eastern third; it has no navigable rivers of any importance, and will never produce an inland city which can rival, in any respect, the commercial capital of the Mississippi valley.

CHAPTER II.

EASTERN KANSAS.

The Railways running westward from St. Louis.—Kansas City and Leavenworth rival cities.—The wonderful energy of their Inhabitants.—Railway Connections.—How American Cities are formed.—The Social System as seen in Kansas.—Continue our journey to the end of the Kansas Pacific Railway.—How Towns spring up along the Line.—Salina the Terminal Depôt.—Camp Life at Salina.—Our Visitors and their Adieus.

Distance travelled 471 *miles.*

Two railways cross the State of Missouri, to connect St. Louis with Kansas City, a distance of about 282 miles. The one is the Pacific Railroad of Missouri, running on the south bank of the Missouri River; the other is the North Missouri Railroad, traversing the valley on the northern side. The scenery on the more southern of these roads—viz., that over which I travelled—is very beautiful. At one time we would skirt the broad and majestic river; at another dive into the forests—for all this country is still thickly covered with hard timber; and then shoot over one of the innumerable brooks and rivulets which crossed our way, so that a constant succession of leafy vistas delighted us as we passed. Farther west, much of the country was gracefully undulating; and although we passed no large towns, villages were very numerous; while the well-made fences and good-sized farm-houses, which could be seen across many a "hundred-acre clearing," spoke well for the richness of the land, and the prosperity of the husbandman.

At the entrance of Kansas, exactly on the eastern boundary line of the State, two large towns, the fruit of commerce, have

sprung up—Kansas City and Leavenworth. The former is situated on the southern bank of the Missouri, just at the point where that stream makes its huge bend northward, and receives the waters of the Kansas River. Its population is about 18,000. The latter lies also on the left bank of the Missouri, about thirty miles above, and to the north. It is beautifully situated, on extensive heights overlooking the surrounding country, and has long been the most favourite military post west of the Mississippi. It claims a population of from 27,000 to 30,000.

Great rivalry exists between these young giants; they are both striving for an enormous prize, and never were two horses at the Derby more evenly matched.

The tendency of development in the inland States has been to raise, at distances of from two to three hundred miles, large and independent commercial centres; such for example as Pittsburgh, Buffalo, Cleveland, Cincinnati, Chicago, and St. Louis. The advantages of position on the great lines of travel have, more than anything else, determined the points at which such cities as these should eventually spring up. At first they simply start as active distributing posts to the countries around, selling goods manufactured elsewhere, and buying for transportation the agricultural produce of the neighbourhood; then as the population increases, factories rise, and the raw material is manufactured on the spot. Soon the mineral wealth of the country becomes developed, and as the coal, the iron, the copper, or the lead flow into the busy centre of capital and construction, rolling-mills and machine-shops are soon hard at work, and the plough, the iron rail, and the steam engine, with all other sorts of manufactures, are produced on the spot, and an industrial centre, complete in itself, is thus established.

There is no London or Paris in the United States, there is no single nucleus, to which all who can, resort for the enjoyment of a three months' season; but when I pass from one of these American cities to another, when I find each with its opera-house, and theatres, its parks and suburbs, its elaborate system of railways radiating from it, its distinct society, acknowledging no superior, I do not recognise a large country town, but a young capital rapidly advancing to maturity. As years go by, and the population is numbered, not by the thousand, but by the hundred thousand—when we begin to talk of the wholesale part of the city, the best street for shopping, and the correct part to live in—for I fear even America is not free from vanity and Mrs. Grundy;—when, in fact, we commence to be aristocratic, and ask, Who is who? we find, to our astonishment, that the rich old gentleman we have learned to look up to was once the happy owner of no more than an acre of waste land on Main Street, and that all the families at whose hospitable fireside we received a hearty welcome, have an unlimited belief in the advance in value of real estate. Such in short will suggest the history of the cities I have named.

The merchants and tradesmen of Kansas City and Leavenworth know all this perfectly well. They look around them and see that 2,500 miles of navigable waters, leading far up into the north-west, pass their doors. To the east lie the rich agricultural lands of Missouri, extending to St. Louis, 300 miles distant; to the west, one-half Kansas is not inferior to Missouri in soil and climate; while to the south, the fertile Neosho valley, and the coal and marl-fields of South-Eastern Kansas, complete the vision of future greatness. They recognise fully the importance of the position, the natural wealth of a locality which has out of its abundance produced

twin cities almost on the same ground; but as both cannot grow to equal greatness; as one is destined to remain a country town, the other to become a large and flourishing city, both parties put their shoulders to the wheel, and turn their energies to the perfecting of those connections which are to unite them to the rest of the continent. But here, again, fortune does not seem inclined to favour one city more than the other. The Southern Trans-continental Railway has given to each an eastern terminus; that at Kansas City unites with the railways from St. Louis, that at Leavenworth with those from Chicago and the north-east; the forks unite at Lawrence, distant about 30 miles, and continue onward as a single line. So much for the railroads, destined to give them a western outlet at San Francisco, on the Pacific, just 2,000 miles distant. Due south of Leavenworth, on the 95th meridian, lies the fine harbour of Galveston, the natural outlet on the Gulf of Mexico for all this region. A railroad to this port also, has been commenced, and, like the Kansas Pacific, starts from Kansas City as well as Leavenworth. Both forks are to unite some 100 miles to the south, and continue onwards as a single line, traversing regions of unrivalled richness, including the coal-fields of Southern Kansas, the Indian territory, and Eastern Texas. To connect with the civilised world east of the Missouri, this river must be bridged, and, in the matter of bridging, Kansas City has beaten Leavenworth; her bridge is finished, and the trains of two railways daily pass over it. But the men of Leavenworth have already set to work; and although the river is much more difficult to bridge there than at Kansas City, they will undoubtedly do it before long, thus uniting the Kansas Pacific Railroad a second time with those of the east and north-east, so that they can compete on almost equal

terms with their rivals for the great through trade of the West.

Had it been possible, I should have prolonged my stay amongst the people of Kansas, for their social system is peculiar. The State well deserves its name—"The Paradise of Petticoats"—for, disregarding its early existence, when, as "Bleeding Kansas," it passed through a baptism of blood, and only studying the new life upon which it has since entered, we find that if woman reigns supreme anywhere upon earth, it is here. All the advanced form of thought upon education and woman's rights have been imported direct from the New England States, and have quickly developed in this virgin soil to an extent hitherto unprecedented. Schools spring up like mushrooms wherever a dozen houses can be found within a mile of each other, for the "progressive" inhabitants are always looking ahead, and consequently prepare for the expected families.

From the sixth annual report of the Superintendent of the Public Institutions, the following statistics have been gleaned:—

	1865.	1866.	Increase in a year.
Number of Free Schools . . .	721	871	150
,, Teachers	997	1,086	89
,, Scholars	26,341	31,258	4,917
	Dollars.	Dollars.	Dollars.
Teachers' Salaries	87,898	116,924	29,026
Assessed in districts for Schools	106,589	192,620	86,031

Besides these free schools, there are 83 select schools, with 113 teachers, and 3,228 scholars; 3 academies and 9 colleges, numbering 39 professors and teachers, and 948 students, subscribed for and supported by members of sectarian denominations, political or religious; lastly, there are three high schools, or State insitutions, viz., the State Normal School of Emporia, in Lyon County, for the special

education of teachers; the State Agricultural College, at Manhattan, endowed with 90,000 acres of fertile land; and the State University, at Lawrence. Neither in the granting of degrees, nor in the course of instruction, is the slightest distinction made as to sex. "This, without doubt," says the President of the University, "is both just and expedient. It is no small honour that the Mediterranean State should be the first to recognise the rights of woman in her educational system." All through the States, in most ladies' schools, one evening in the week is set apart for the reception of the male friends and brothers of the girls, so that, from infancy, the sexes are but little separated. The progressive school at Kansas hopes soon to do away with ladies' academies altogether, so that the gratifying sight now to be seen at these three high schools, of young men and maidens reciting together in the same classes, will become the universal custom. Can it be wondered at, that scarcely a political contest takes place anywhere in Kansas, at which petticoats are not well to the front; and that woman's suffrage and equal rights form a part of each platform in every election? Bold, indeed, would be the man in Kansas who dared to oppose openly this phalanx of political Amazons.

Let us, however, bid good-bye to the busy towns and the pushing traders, to the railway connections, the Missouri River, and to the lady politicians. "Westward, Ho!" is our watchword, as rapidly the railway takes us past Lawrence, noted for its youthful factories; Topeka, the Kansas capital, famed for its State-house, now being built, its college and its female institute, and Manhattan, remarkable for the beauty of its situation, and agricultural school. Next comes Junction City, whose fine building stone is the best in the State, and whose commercial

enterprise is fast converting it into a fine, well-built town; then Solomon, surrounded by salt springs, and situated at the entrance of a fertile valley, 250 miles long. Lastly, we reach Salina, 185 miles west of the Missouri, where we exchange the cars for the camp, the locomotive for the mule team.

On the 1st of June, 1867, this little town of 1,000 inhabitants was the terminal station at the end of the line. Eight months afterwards, when we were hastening home, the train took us up 100 miles to the west, and two other towns—Hayes City and Ellesworth—had sprung up west of it. The eight towns I have just named are not temporary trading-posts, called suddenly into existence by the presence of a large staff of railroad officials and workmen, and destined to perish, one after the other, as the customers pass onward with the advancing line. At one time, each of these places, besides many others now no more, served its time as the terminal depôt, and was thereby forced into existence with hot-house rapidity. But the natural advantages of their positions, situated as they are for the most part at the mouths of streams,—such as the Big Blue, the Republican Fork, Solomon Fork, and Big Creek,—which water rich valleys of 100 miles and upwards in length, not only ensure their future existence, but add to their size and importance month by month, as settlers arrive and bring the lands of these valleys under cultivation.

Wholesale town-making may not be a romantic theme, or one capable of being made very attractive to the general reader; but it is the great characteristic of this part of our route, and is only to be seen to perfection along the line of these great railways. On the Platte, where the central line across the continent often advances at the rate of two miles a day, town-making is reduced to a system. The depôt at the end

of the line is only moved every two or three months; and as rich valleys are far scarcer in this section of country than in Kansas, the town usually moves also, while nothing remains to mark the spot where thousands lived, but a station, a name, and a few acres of bare earth. Last winter, Cheyenne was the terminal depôt on this route, and increased in size to 5,000 inhabitants. A man I met at Denver, who had just come from Cheyenne, told me that while he was standing on the railway platform, a long freight train arrived, laden with frame houses, boards, furniture, palings, old tents, and all the rubbish which makes up one of these mushroom "cities." The guard jumped off his van, and seeing some friends on the platform, called out with a flourish, "Gentlemen, here's Julesburg." The next train probably brought some other "city," to lose for ever its identity in the great Cheyenne.

The men of Kansas have discovered in these towns as fine a field for speculative amusement as the best managed Homburg could offer. Thousands of dollars are daily won and lost all along the line by speculating in town lots. A spot is chosen in advance of the line, and is marked off into streets, blocks, and town lots, sometimes by the railway company, sometimes by an independent land company. As the rails approach it, the fun begins, and up goes the price of the lots, higher and higher. At last it becomes the terminal depôt—the starting-point for the western trade—where the goods are transferred from the freight vans to the ox trains, and sent off to Denver, to Santa Fé, Fort Union, and other points. It then presents a scene of great activity, and quickly rises to the zenith of its glory. Town lots are bought up on all sides to build accommodation for the traders, teamsters, camp-followers, and "loafers," who seem to drop from the skies. This state of things, however, lasts

only for a time. The terminal depôt must soon be moved forward, and the little colony will be left to its own resources. If the district has good natural advantages, it will remain; if not, it will disappear, and the town lots will fall to nothing. Salina, when we were there, was just at this zenith stage of existence; so I shall describe it as we found it.

On the open grass land between the Smoky River and the Saline Fork several broad streets could be seen, marked out with stakes, and crossing each other like a chess-board. The central one was deeply cut up with cart-rucks, and strewn with rubbish. There had been heavy rains, and the mud was so deep that it was almost impossible to move about. On each side of this main street were wooden houses, of all sizes and in all shapes of embryonic existence. Not a garden fence or tree was anywhere to be seen. Still paddling about in the mud, we came to the most advanced part of the "city," and here we found three billiard saloons, each with two tables, and the everlasting bar. Then came an ice-cream saloon; then a refreshment saloon. Next—we could scarcely believe our eyes—appeared the office of the *Salina Tribune* (I will not vouch for the name). All these "institutions," as well as a temporary school-house, and several small well-stocked shops made of wood unpainted, evidently represented first principles—the actual necessities, in fact, of Western life. Opposite was a row of substantial "stores," having their fronts painted. The builder here was evidently a rash speculator. He did not look upon Salina as a Julesburg, but intended to tide over the stage of depression. Each of these houses was already inhabited, and piles of unpacked goods lay fronting them in the streets. On each side was an "hotel," at the door of which—it being just mid-day—the landlord was ringing furiously a great bell to announce to the inhabitants that dinner was ready. And

what a dinner!—fried fish, fried mutton, fried eggs, fried mush (a great luxury), fried potatoes, and fried pudding—all swimming in grease; bad coffee without milk, dough cakes without butter, and muddy water out of dirty glasses. Trying to escape up a side street, we discovered the Methodist Chapel, the Land Agency Office, labelled "Desirable town lot for sale," the Masonic Hall (temporary building), and the more pretentious foundations of the Free School, Baptist Chapel, and Episcopal Church. The suburbs consisted of tents of all shapes and forms, with wooden doors; shanties, half canvas, half wood. These were owned by squatters upon unsold lots. All around were scattered the empty tins of the period, labelled in large letters, "desiccated vegetables," "green corn," "pears," "peaches," "oysters," and other untold luxuries.

Still farther from the centre, dotted here and there, white and glistening in the sun, we could see the camps of the "bull trains," each made up of from ten to twenty huge wagons, covered with white canvas, coralled sometimes in the form of a square, sometimes of a circle, so as to form a place of protection if attacked by Indians. An unusually wet season, and the fearful depredations caused by the red-men further west, detained an unusual number of these trains at that time around Salina. Partly shutting out the horizon on two sides, was a continuous belt of rich green trees. These might have been the commencement of a fine forest; but alas! as we came up to them, we found only two rows—one on each side of the river; and beyond, the same broad sea of grass, the undulating plain, relieved only by some distant bluffs. The grass was rich and abundant—a very fortunate circumstance; for everywhere were to be seen the droves of oxen, mules, and horses belonging to the wagon trains, feeding and fattening on their idleness. About the railroad station, and

on each side of the line for some distance, lay pile after pile of the munitions, not of war but of peace—iron rails, oaken ties, cradles and pins, contractors' cars, little houses on wheels, trucks innumerable, both empty and full; while at the opposite side to the town, our picturesque little camp of twenty wall tents, formed in a square, and flanked by our wagons and ambulances, lay peaceful and cool on the short green sward.

Our chief, General W. W. Wright, who had already gained for himself lasting laurels by the manner in which he had conducted the railroad operations of Sherman's march through Georgia, made Salina the rendezvous for all our parties. Here many of us met for the first time, and the fortnight's sojourn, spent in completing our organisation and waiting for the weather, passed pleasantly by. Settlers rode into camp from far and near, one with a lump of gypsum, another with a piece of coal, a third with a curious fossil, and a fourth with a block of building-stone—all anxious to know what our geologist, Dr. John Le Conte, thought of their specimens; ready to tell all they knew of the country (especially of the advantages of their own locality), and eager to hear about the intended survey. Then our botanist, Dr. Parry, commenced his rambles amongst the prairie flowers, and very beautiful were these heralds of spring, all quite new to us, though well known to that experienced western traveller. Dr. Lewis, who had no sick to cure in this fine air, would bring in each night some new and curious insect, some wondrous coleopter, to add to his collection. The surveying instruments were unpacked, and Messrs. Eicholtz, Runk, and Imbrey Miller might be seen, each coaching his party, trying his transits and levels, running a line here, and a line there, and getting everything into working order.

My friends, Stuart and Captain Blair, were even in greater demand than any of us; for on them devolved the task of organising the commissary and quarter-master's departments. But as old soldiers, though young men, they were by no means novices in these branches, so necessary in an expedition like ours. And lastly, while unpacking my glass, making my collodion, trying my camera, and fitting up my ambulance, I could not altogether be put down as an idle man. The idle man in fact was not represented.

The day but one before we started was long remembered, and talked over by us around our camp fires.

One of those large excursion parties so much in vogue in the United States, had been given by Mr. John Perry, president of the company. Many ladies and gentlemen from far-off Philadelphia (2,000 miles away), and many more from St. Louis, had all come to learn how railways were built, to travel over the plains, to see a buffalo hunt, and, in many cases, to bid good-bye to sons and brothers already amongst us at Salina.

If senators and congress-men, "literates" and railway kings, could make a party distinguished, this company certainly had no need to fear obscurity. But when we met bright laughing faces at our doors, and heard sweet voices in our tents,—when, for the last time, little gloved hands touched ours, and fair ones wished us "God-speed, and a happy return," I fear we would have forgotten the congress-men's presence altogether, had they not carried off so soon our sisters and friends.

CHAPTER III.

LIFE ON THE PLAINS.

Commence our March.—Frightful Storm overtakes us.—Effects of the Storm along the route.—Buffalo Tracks and Indian Trails.—Mexican Bull Trains.—Reach Fort Harker.—Military Posts of the Western Country.—The Indian Difficulty.—Ellesworth.—Harmless and Poisonous Snakes, Horned Toads, and Prairie Dogs.—Antelope and Buffalo; the First Death.—Indian Troubles ahead.—Reports of Massacres come in from all sides.—Stage-coach attacked.—Reach Fort Hayes.—A Buffalo Hunt.

Distances:—Salina to Fort Harker, 36 miles; Harker to Fort Hayes, 72 miles. Total, 106 miles.

EARLY on the morning of Saturday, 7th of June, our line of wagons, twenty in number, headed by three ambulances, slowly moved away from our first camping-ground. The weather had been, and was still, very unpropitious; every night, and in fact all night through, the horizon was almost a continuous sheet of flame, and constant thunder-showers drenched the ground, and filled the gullies to overflowing. I have passed through many a thunderstorm amongst the Alps, and have seen "a storm in the Rocky Mountains," in reality as well as on canvas, but nowhere have I encountered one in such perfection as on the plains. Nowhere do the elements appear so frantic with rage. The fight seemed to us almost endless, for if we were not actually on the battle-field, we could see it raging all the same at some point on the horizon. The thunder, I often noticed, was never as loud as I have heard it in the Eastern States and in Europe, but the thick bars of lightning would remain visible for a much longer time, and

June 7. Left Salina.

quiver twice or thrice before they darted into the earth; and the chains of fire would twine like serpents among the clouds with a marvellous brilliancy. About noon, on our first day's march, thick clouds began to creep over the sky, while distant lightning played around as usual. The air was very sultry and oppressive; the mosquitoes unusually annoying. Scarcely had we come in sight of our camping-ground, known as Spring Creek Station, when down came the rain and hail in torrents. Half-a-dozen tents were soon out of the wagons, and with great exertions we fastened them down tight and crept inside. Hour after hour down poured the rain, the thunder and lightning were not an instant still, the low land in front of us was already a muddy lake, and nearer and nearer came the water's edge. At last, just about dark, we were drowned out like rats, and had to hunt for some other resting-place. Wading up to our knees in slush, we crept from one wagon to another as we found them filled with teamsters and troops; for those who had no tents were the first to take to the wagons. All crept in somewhere; and as everything has an end, daylight at last relieved us of any more vain attempts at sleep, and brought the first night of our journey to a close.

All along the Smoky Hill valley this storm had been unusually severe. It deluged the senatorial party, while they were camped at Fort Harker, twenty-four miles distant; and I was assured by some settlers afterwards that for seventeen years such a storm had not visited the West.

Seventy miles west of Fort Harker, at the next military post, Fort Hayes, the stream which enters the Smoky River at that point, known as "Little Big Creek," rose so rapidly on this same night of the 7th of June, that five men who were sleeping in their huts close to the river-bank were drowned; and one of the officers, with his wife and family, had great

difficulty in escaping from the roof of their log-hut on an improvised raft.

The ground was so heavy, and the brooks were so swollen, that our daily travel was slow, and we had considerable difficulty in fording many of the gullies. Curious things are these meandering streams of the plains. The banks are low, and formed of dark, rich clay; the water is muddy, alkaline, and often reddish; there is scarcely a tree, except on the larger streams, to mark their course, and yet their length is almost interminable. A little stream you can jump across has its source, probably, 300, 400, or even 500 miles away in the West.

Before we reached Salina, trees had become very scarce—the cotton-wood and willow on the margin of the streams alone being visible; but as we moved farther, even these ceased to grow, except in favoured spots, which were often miles apart. The short, tender buffalo-grass gradually appeared—at first only here and there, but at last it abounded everywhere; and ever and anon we crossed the well-beaten trail of the monarch of the plains. Buffalo-wallows—round flat basins about three yards in diameter—often covered an acre or two, showing how the animal loves to bathe his irritated hide and scratch his winter coat off by rolling in the mud. With great curiosity we examined an Indian trail, and learned to tell one from that of the buffalo.

The trail of the Plain Indian consists usually of three paths, close together, yet at fixed distances apart. They are produced as follows:—The framework of their lodges or tents are made of long poles which, on a journey, are tied to each side of a pony, and allowed to trail upon the ground. The result is that a long string of ponies, thus laden and following each other, will wear a triple path—the central one

being caused by the tread of the ponies, the two outer by the trailing of the lodge-poles.

From Salina to Fort Harker our course took us along the travelled road to Denver and New Mexico, and plenty of company we had on the way. At every mile or so we would pass long ox-trains heavily laden with goods (I have counted as many as eighty wagons in a train), and if *we* found the

Sioux Indian Lodges or Tents; one packed for a journey, the other standing.

bad roads difficult, how much worse was the travelling for them! Each wagon carrying from 6,000 lbs. to 8,000 lbs., would be drawn by eight, sometimes ten, yoke of oxen, which number would require about three "bull-whackers" (generally swarthy Mexicans) "to help them along," with their heavy leather thongs. When one of these wagons stuck fast in a gulley, it was amusing to see the enormous amount of brute

force which was applied to pull it out. The oxen from two of the wagons which had passed safely across would be attached to the one in difficulties, making a continuous string of from eighteen to twenty yoke. To accomplish even this, usually required an amount of swearing and torturing on the part of the drivers which would be startling to the nerves of most men not reared on the plains. When all was ready, and a dozen "bull-whackers" had taken their places along each side of the line of oxen, a frightful shout would fill the air, followed by the fierce cracking of whips on the devoted hides, and the usual chorus of endearing terms. The poor oxen, thus goaded on to madness, would give one tremendous tug, the usual finale of which used to be, not in the least to move the wagon, but to break the thick iron chain which fastened all together. As we retired out of sight over the brow of the next undulation of the plain, we would usually leave our Mexican friends trying in vain to stop the loosened string of oxen (who could not be persuaded they were not dragging something), preparatory to going through the whole process again.

Our general course lay in the valley of the Smoky Hill Fork. Our destination was Fort Wallace, 216 miles from Salina, at which point our survey was to commence.

The rule was to breakfast at 5 o'clock, and start at about 6.30, so as to get over as much as possible of the road before the heat of the day. The rains, however, having cleared the air, there was no necessity to break the march by a mid-day halt, while the cool breeze from the far-distant mountains, springing up usually near noon, made travelling even in June and July by no means disagreeable. On the afternoon of the 10th we camped at Fort Harker, thirty-six miles from Salina, a well-built, three-company post, with spacious storehouses filled with munitions of war, but, like all these military

establishments, carrying out in no particular the term "fort." Along the main lines of travel throughout the whole western country, at distances of from 60 to 300 miles apart, the United States Government are obliged to maintain a great number of these little military establishments. There are upwards of fifty of them in the territories we passed through *en route* to the Pacific. In many instances not a white man lives in the intervening country, and yet without them overland travel would be impossible. Too thinly garrisoned to wage aggressive war against the red-men, they afford the only protection the emigrant or the traveller has to hope for on the way.

It is hard to conceive any life more lonely or monotonous than that of the two or three officers stationed in one of these distant forts. It is often dangerous even to hunt in the country around, for the sneaking Apache or the treacherous Comanche may be lurking hard by, like a snake in the grass. There are no rivers to fish in, no neighbours to visit, and as for books, they are soon read through. I remember the lamentation of one of these poor officers. On leaving Fort Leavenworth with his regiment for distant service, and anxious to take with him a good stock of books, he applied to the quarter-master, to enable him to transport this extra quantity of personal baggage. "Government regulations were imperative; only so many pounds could be allowed—regretted not having the power to grant the favour asked." Such was the reply. So the extra weight of books had to be abandoned.

Another officer afterwards applied, and stated his case. He was the fortunate possessor of two ten-gallon casks of the best Borbon whiskey, "So unusually fine that you must allow me to send you up a sample, you can then appreciate more fully,"

Vincent Brooks Day & Son lith

"BULL TRAINS" CROSSING THE PLAINS

said the bashful suppliant, "what my feelings must be at the thoughts of leaving it behind." "My dear sir," replied the quarter-master, touched to the heart, "of course you can take it; anything in reason, my dear sir, anything in reason."

Where wood can be obtained, the fort generally consists of rows of log huts or frame houses, well-built and often made very comfortable, enclosing a central parade ground, with a large building or storehouse; a hospital corresponding to the size of the post; a suttler's store, where usually many things can be bought which are rare luxuries on the plains, but at very high prices; a blacksmith's forge, and other buildings. If the post is so small that an attack on the little community itself is not improbable, a low wall of mud-bricks (adobe), stones, or both combined, is built around it, and one or two six-pounders may not unfrequently lurk behind this breast-work. Otherwise no attempt whatever is made at outer fortifications. If good building-stone can be had close at hand, then the fort becomes a far more durable structure, and considerable pride is often taken by the officer commanding in the designs and construction of the buildings; but if wood is scarce, and there is no good stone near at hand, then the Mexican style of building is resorted to. Bricks are made of mud and straw dried in the sun; and of these all the buildings are constructed. One unaccustomed to this style of architecture would be surprised to see what comfortable houses, and even large buildings, can be made in this way; but as in New Mexico we shall become very familiar with it, there is no need at present to mention it further.

Although the cost of maintaining these posts is enormous, their usefulness is undoubted; but how much better would it be if the evil which necessitates them could be removed? The construction of railroads throughout the country is with-

out doubt the only permanent way of solving the difficulty. As these advance, the forts on the lines of travel, one by one, become useless, while the Indians, after receiving a series of good thrashings from the settlers, soon learn, like the Great Pah-ute nation in California, that their days of successful warfare are over, and that their only chance is to keep quiet, and to allow the Government to feed them.

We left Fort Harker on the morning of the 11th, and, three miles beyond, passed through Ellesworth, a wonderful place, having seven or eight "stores," two hotels, fifty houses of other kinds, occupied by nearly a thousand persons, and yet just one month old. Six weeks ago the wild buffalo was roaming over its site, and the Indians scalped a foolish soldier whom they caught sleeping where the new school-house now stands. The day of the buffalo and Indian have passed for ever; never again will the one graze, or the other utter a war-whoop on this spot.

During the two following days we strained our eyes in vain for a glimpse at the big game; their marks were everywhere—tracks, wallows, and skeletons innumerable. We killed many reptiles—the pretty little garter snake, and the long and graceful racer, one of which species measured over six feet: and several of those venomous pests of the plains, the rattlesnake. As a general thing, it is not hard to tell a poisonous snake from a harmless one. The head of the former is covered with large scales, usually five in number, while that of the latter is covered with small ones, similar to, and continuous with, those covering the neck and body. Again, if you turn the serpent over you will find that, if it is harmless, the succession of semicircular scales which cover the under surface, continue unbroken to the tip of the tail, while at the caudal extremity in the venomous species these

ventral scales become divided in two, and continue so to the tip. Several tortoises were seen, and one specimen of the horned toad was captured—a prickly little fellow whom we did not expect to meet quite so far east.

But what most delights all travellers on the plains, at first, are the prairie dogs. These little rodents are the size of a rabbit, the colour of a hare, have the hair of a rat, and the

A Prairie-dog-town and its Inhabitants.

face of a squirrel; but their tails are original, they stand up straight over their back, and do a most enormous amount of wagging. They are the most sociable little fellows in the world; by nature they live in colonies, called by the ranchmen "Prairie-dog-towns," where they often cover many acres of land with their little mounds. Each mound has a hole in the top, leading to the family apartments. They

appear to take a most lively interest in "the advance of empire," for wherever there is a road, there they congregate in unusual numbers. In the centre of the main street at Salina, three of these little fellows had established themselves, they seemed to enjoy the bustle of that place, and were the great delight of the children, who used to feed them with nuts and crackers, and get them to sit upon their haunches, and eat with their claws. To frighten or kill one would have brought down the just indignation of the whole neighbourhood. As our line of wagons moved along the road, and approached a "dog-town," the little fellows who were above ground, cropping the grass and playing about, would immediately rush each to his "look-out station" on the top of his mound, while lots of little heads would suddenly appear as those from below came up to see the fun and join in the chorus of sharp barks with which they were wont to greet intruders. They would shake their sides with barking, and at every bark the tails would wag until, worked up to a climax of fear and delight, they would rush into the earth with a volley of half-uttered barks, and a last defiant wag of the little tail. No sooner had we passed than they would appear again, and keep up a chorus of adieus until we were out of hearing. Their flesh is good to eat, being very much like squirrel or chicken; but they are too sharp to be caught away from the top of their mounds, and if shot in this position they always fall into their holes, and die out of reach. The only way to get them is to drown them out by pouring water into their holes, and if the subterranean connections are extensive, or the soil very porous, this cannot be accomplished.

It has been stated by western travellers that the rattlesnake and a small species of owl live in peace with the

prairie dog and share his dwelling. I have frequently seen them all in company together, as represented in the sketch, but it is probable that, although the mature prairie dog can protect himself, and has therefore no fear of the intruders, the young are devoured by the latter.

At mid-day, on the 13th, we had just pitched our tents on the banks of the Smoky River when the cry of "antelope!" was raised, and, sure enough, a small herd, frightened by something behind them, ran swiftly by our camp. They immediately received a volley of rifle balls, which produced no other effect than to send them bounding off gracefully across the river. This little excitement was hardly over when buffalo were sighted across the Smoky. There was an immediate rush for the high bluff close by, and away to the left we could plainly see through the glasses six black shaggy fellows languidly chewing the cud, about five miles distant. Three of our party immediately started on foot, notwithstanding the heat of the day and the eighteen miles march just over, for as yet but few of us were mounted, and these only on mules.

From this point, until we reached the Arkansas River, buffalo were a common sight. Before night we had seen several herds roaming about upon the plains, the largest, however, only containing twenty head and some calves. At sunset one of the three hunters came back to announce the success of their chase, and to give notice to the watch that his two companions were following more slowly, heavily laden with choice pieces of the carcass they had killed. As our meat had for some weeks been almost entirely salt, this news was especially agreeable.

We had no sooner found ourselves in the land of the antelope and the buffalo, beyond the little "cities," and out of hearing of the locomotive, than Indian troubles began to

cast their shadows around us, deeper and deeper, as we moved forward.

Never before had hostility to the pale-face raged so fiercely in the hearts of the Indians of the plains, and never had so large a combination of tribes, usually at war with each other, been formed to stop the advance of the road-makers. From Dakota to the borders of Texas every tribe, save the Utes, had put on war paint, and had mounted their war steeds. Reports came from the north that the Crows and Blackfoots had made friends with the Sioux, and from the south that the Cheyennes and Arapahoes, the Kiowas and Comanches, had been seen in large bodies crossing the Arkansas, and moving northward. The horrors of the last summer were fresh in the minds of the frontier men, who remembered many a comrade scalped by the red-skins. They laughed at the treaties of the Fall, at General Sherman's councils, and Samborn's wagon-trains laden with gifts. They said, "Wait till the spring, till the frost is out of the ground, and the grass is green and abundant, and then see how the savages will keep their treaties." This season had arrived, and the Indian horizon looked blacker than ever. The Fort Kearney massacre, in which some of the wives of the officers were brutally murdered, and the energetic demands of the railway company on the State had resulted in a considerable military force being sent into Nebraska to protect the road to Salt Lake. This had the effect of driving many additional bands of Indian warriors southward, to harass the poorly-guarded route along the Smoky Hill Fork.

The warriors in many a big talk had sworn to clear their hunting-grounds of the hated intruder. He should no longer drive away their game, or build embankments and put down stakes across their broad lands. So they commenced the fight in their own fashion.

A company, called the "United States Express," carrying the United States mails, had been organised two years before, to run from Denver to the end of the railway advancing along the Smoky Hill River. Stage stations had been built along this route, at distances of from twelve to eighteen miles apart, where the stock of the company was kept, and at which the coaches changed horses. During the winter these coaches ran pretty regularly; but April had scarcely passed before the stages and mail stations became the first though not the only objects of attack. Reports, one by one, came in to us from the West.

On the night of April 30, Goose Creek Station was attacked, the stock carried off, and three mules killed.

On May the 9th, Monument Station, midway between Hayes and Wallace, and Big Timbers Station, were simultaneously attacked, while a third party tried to burn Chalk Bluff Station. I may add that as Big Timbers, twenty-five miles west of Fort Wallace, had been formerly a favourite Indian burying-ground, it was on that account especially subject to attack.

Two days after, Pond Creek Station, two miles west of Fort Wallace, was attacked and fired.

On the 18th, the Indians attacked Smoky Spring Station; on the 24th, Big Timbers again; on the 27th, Pond Creek again, and drove off many head of cattle. The day before they had attacked the stage-coach, and had commenced the month of June by scalping and horribly mutilating two frontier men on the 3rd, and two more on the 7th, within a few miles of Fort Wallace. These, and many other massacres, took place along the road while we were at Salina; but in so large and thinly-peopled a country, news of a portion of them only could be expected to reach us. The savages even penetrated

to within twenty-five miles of Salina, and killed three German farmers, who had that spring settled in the valley of the Solomon.

As we advanced, every stage or train from the West (they were however becoming few) told the same tale. On the 12th, the stage horses at Hanshaw's Ranche were driven off; Hugo Wells Station was attacked; and the mules of a Mexican train on another part of the road were stampeded.

On Saturday, the 14th, as we neared Fort Hayes, we met the overland mail-coach from Denver: the passengers had been obliged to fight their way through, and had succeeded in running the gauntlet, with the loss of one soldier killed and one civilian wounded. They had been attacked by twenty-five warriors, on the 11th, near Big Timbers. Hoping that the Indians only desired plunder, they threw some of the baggage from the coach, and then started their horses off at a gallop, while the half-dozen soldiers on the roof, who acted as escort, kept up a brisk fire. In this way they reached the next stage station.

The coach was riddled with bullets and spattered with blood, so that I was not a little surprised at the remark of the "lady" passenger inside, who, in answer to our sympathy, said, "She had not been much frightened." I remembered, however, that we were in Kansas.

Sunday, the 15th, was passed at Fort Hayes. We found the garrison nearly all under canvas; for, as I mentioned before, the storm of the 7th had completely flooded the miserable collection of log-huts which were known by that name. Here we left our temporary guard of two dozen darkey soldiers, and met our regular escort, a company of the 7th United States Cavalry, numbering about fifty, under the command of Captain Barnitz, an officer in whose pleasant society

I have had so many delightful rides, and exciting chases after the buffalo, that I shall long remember him as one of the best of my Western friends.

On the previous Wednesday, General Hancock, Mr. Perry, and one or two more—the remnant of the gay excursion party—had started with an escort to visit Fort Wallace, *en route* for Denver. The general had come out West to see if the Indian depredations were a myth or not (for at Washington, and in the East generally, no one believed the reports), and, if necessary, to devise some effective course of action. During his whole journey, as might have been expected, he neither saw an Indian nor heard a war-whoop, but enough fresh-turned sods and dying soldiers greeted him on his homeward march to convince the greatest sceptic that the Indian war was no idle tale.

Soon after sunrise, our train of wagons moved slowly
June 16. past Fort Hayes. We had gained greatly in strength since our last day's march; the twenty wagons had increased to forty-seven, and the cavalry, which flanked us on the right in the form of a little square, with flag flying gaily in the centre, added immensely to the dignity of our march. The day before I had picked up a very good nag, a chestnut sorrel mare, nearly thorough-bred, whose master had given up all hopes of getting her safely to Denver. I was trying her paces, and wishing for a gallop over the short, elastic sod, when suddenly I spied four fine buffalo throwing themselves along, and bearing straight down upon us as fast as their awkward legs could carry them. Borrowing an additional revolver, I darted off, and found that a rival in the field, who was pressing them hard in the flank, was the original cause of their flight. Singling out the one to the extreme left, a tough old bull, I made straight for him, Colt

in hand, cocked and ready. As soon as he saw a fresh enemy approaching, he stopped, surveyed the position for an instant, jerked his huge head to one side, which seemed to swing his body round, and rushed off in the opposite direction. I was soon alongside, watching his every movement.

What curious freaks of nature these North American buffalo are! The small hind-quarters look out of all proportion to the massive strength of the shoulders and chest; smooth, and apparently shaven, like the back of a French poodle, they do not seem to belong to the same animal. The hind legs are small, and stand close together; the fore legs thick, short, and far apart. Between them the huge head hangs low; it is completely covered with long shaggy hair, matted together, which hides the features, and only allows the tips of the crescent-shaped little horns to appear. Thick hair, for the most part, conceals the hump from sight, but both add immensely to the massive effect of the fore-part of the body: the little corkscrew tail, ends in a tuft. My antagonist kept lashing his naked flanks, while at moments I could see, by the sideward toss of his head, that he was having a look at me, though his eyes were completely hidden by the hair. My first shot, I presume, passed harmlessly over his back; with my second, from the distance of half-a-dozen yards, I planted a ball in his side, but too high up to take immediate effect. He threw himself angrily round for an instant, and off swerved the mare, for she evidently knew her friend and his habits well. He did not charge, however, but made straight for Little Big Creek, which was swollen to a deep torrent by the heavy rains of the previous week. My companion in the chase, who had with his last shot brought down the fat cow he was following, then dashed by, and planted a second ball in the brute's carcass. The ball did not, however, lessen his

speed. Just before he dashed into the creek I came up again and gave him his third bullet. The crossing he had chosen was very miry, and too full of timber for our horses, so we entered the stream a little higher up. It was very deep and rapid, and we had some difficulty in swimming across. When we caught up to our buffalo again he was a good deal exhausted, and we could plainly see three little streams of blood trickling down his sleek hide. As escape was hopeless he became very savage. When I hit him again, he turned deliberately round and charged. He did this three times; but each time his gait was slower, and he threw himself along with greater difficulty. At last he pulled up; we also drew in the reins, but kept close enough to see everything distinctly. He shook his shaggy mane two or three times, and lashed his flanks angrily, as he looked around and saw us watching him. He walked a few yards farther, and blood poured from his mouth and nostrils; then he laid quietly down, and rolled over on his back, with his legs thrown up in the air. We sent a bullet, for precaution, through his heart, and in a few moments our knives were out of their sheaths, and our delighted horses were burying their nostrils in his matted mane.

When a large herd of buffalo is encountered, there is little or no danger risked from the animals themselves by riding straight into their midst, for panic seizes them all, and their only thought is flight. But when one of those little herds of from four to a dozen are attacked, which have now in most districts taken the place of the larger herds, these wary old fellows are often found to be very dangerous. Some weeks after the hunt just described, I nearly ruined my mare for the sport by persisting in my efforts to bring down one of these champion buffalo.

Having succeeded in separating her (for she was a cow) from her half-dozen companions, she sternly refused to make any further attempts to escape, and bravely challenged me, although unwounded, to single combat on the open plain. Thrice, when I approached her, she charged down upon me in splendid style; and as I had nothing to aim at but her head, I fired each time straight in her face, which, as might have been expected, proved quite useless. My mare at last was so terrified at such unusual pluck on the part of her opponent, that she became unmanageable, so I confessed myself beaten. The cow was killed a few hours later by some of our party on foot, and they found that one of my bullets had passed through the muscles of the back, parallel with the spine, from the front of the neck almost to the tail. It is well to be cautious in attacking a small herd, for if the horse trips up in a prairie-dog's hole, or the rider is thrown from any other cause during the chase, the buffalo is not unlikely to trample him to death.

CHAPTER IV.

GENERAL FEATURES OF THE COUNTRY FROM SALINA, KANSAS, TO THE ROCKY MOUNTAINS.

Causes which lead to the Scarcity of Trees.—Buffalo-grass and other Grasses.—Wild-flowers very beautiful, a sign of fertility.—Country becomes arid between long. 99° and 100° in Kansas, and this arid tract reaches to the base of the Rocky Mountains.—The Country improves again on reaching the Rocky Mountains.—Pine Forests and Coal Beds.—Will Cultivation increase the Rain-fall?—Camp of Death Hollow.—The Surprise.—More Indian Depredations.—Reach Fort Wallace.

Distance 108 *miles.*

ANOTHER week's marching brought us to within a day's journey of Fort Wallace, during which time nothing of special interest occurred. By day we fought the mosquitoes, for the weather had become very warm, especially in the morning until the mid-day breeze had sprung up. By night we kept a vigilant watch, and often transformed a hungry prairie wolf into a hostile Indian creeping through the grass. Midnight alarms were at first decidedly more numerous than red-men.

It is not easy, in a few words, to report fairly on the country through which we passed since leaving Salina. For the first 100 miles there could be no doubt about the fertility of the soils: the loam on the surface was thick and rich, streams were numerous, and there was every indication of a plentiful yearly rain-fall. The scarcity of timber on these plains arises neither from want of water nor poorness of soil, but simply from the difficulties and dangers the young trees in their wild state have to pass through. Prairie fires in the autumn kill them; and the buffalo not only eat the tender

shoots, but, while shedding their coats in the spring, pull down quantities of trees along the river banks. Colonel Greenwood, who has up to this point surveyed most of the railroad, complained terribly of these animals knocking down his guide stakes along the track in this way, so that miles of the road had to be re-staked.

When the young plants can be protected from the fires and the buffalo, there is no doubt but that the settler in this section of country, just as well as on the prairies of Indiana and Illinois, can grow as many trees as he likes, and cover his garden with refreshing shade.

Almost the only tree to be found here is the cotton-wood (*Populus monilifera*), so called from its white downy seeds. It belongs to the same family as the willow and poplar, grows rapidly to a large size, and gives a beautiful shade; but the wood is the worst possible, rotting rapidly if exposed to the weather, and forming a most fertile nest for insects if used for in-door purposes. Close following the cotton-wood from the East, as settlement advances, come the alder and ash; and, some distance behind, may be surely expected the heavier and harder timbers of Missouri. Both the soil and climate are most favourable to the cultivation of peach and fig trees, and also to that of apricots, plums, and cherries; the two latter are found wild in the greatest abundance in many places along the streams.

The short delicate buffalo-grass (*Buchloe dactyloides*, Eng.), beautiful as it is with its bunches of pink stamens, and curious clusters of pistillate flowers, is by no means the most desirable grass, as far as the land is concerned. Its close, thickly-matted fibres keep the ground very dry, by preventing the rain from penetrating into it. I have noticed, times and again, after a sudden thunder shower, how rapidly the rain flowed off into

GRAMINEÆ. ASCLEPIADACEÆ. ASCLEPIADACEÆ.

1. BUFFALO GRASS.
2. GRAMA GRASS.
Half natural size.)

ACERATES AURICULATA, ENGEL.
(Half natural size.)
Florets natural size.

ASCLEPIAS MACROTIS, BIGL.
(Natural size.)

the gullies, filling up the streams, and helping to cause those sudden floods and freshets which so often harassed us on our march. Doubtless no grass could bear so well the heavy tramp of thousands of buffalo continually passing over it; but it is a good thing for the land that, as settlers advance, and domestic herds take the place of the big game, the coarser, more vigorous, and deeper-rooted grasses destroy it, and take its place. These new-comers grow with great luxuriance, yielding very fine hay; and at the same time loosening the sod, opening up the soil, and retaining the moisture in the ground.

Next come the wild flowers. The leguminous plants were very abundant; *Baptisia Australis* was at first the most striking, and remained conspicuous for nearly 100 miles west of Salina; many species of Psoralea appeared as we entered a drier region, and with them the Astragali, so abundant on the steppes of Russia. They frequent the far Western plains in such abundance that I soon collected a dozen different species. The Mallows and Compositæ presented some very gay and striking varieties; amongst the former were *Callirrhoe macrorhiza* and *C. involucrata*, the one an exquisite yellow, the other a rich purple. Penstemona were also very numerous, the most beautiful of six species which I collected being *Penstemon cobæa.*

For miles along the march, perhaps, two or three species would make the whole country gay; then a stranger or two would appear—first few in number, but farther on in greater abundance, until at last they would replace altogether their rivals, and become complete masters of the situation, to be ousted in their turn, twenty miles farther, by other fresh varieties. I remarked, especially, that these wild flowers looked neither stunted nor starved; on the contrary, the species that

I greeted as old friends, were larger and brighter than I had ever before seen them, giving most convincing proof of the fertility of the land.

The colours seemed also to follow the same kind of general regularity; at one part all would be white, at another yellow; covering often many square miles, all would be pink, more rarely blue, and sometimes purple.

I think, most assuredly, if we consider even what I have said, there cannot be a doubt that all this region, extending beyond the 99th meridian, and almost to the 100th in Kansas, is susceptible of cultivation throughout without irrigation, and is likely to yield abundant crops and large profits to the farmer.

Not many miles west of Fort Hayes, vegetation begins to suffer from the diminution in the rain-fall, and the general fertility which I have been describing gradually disappears. Streams become less frequent, and dry arroyos take their place. Scrub bushes even are hard to find, and the only fuel to be had during marches of twenty miles or more, is the dry chips of the buffalo dung. Both to the north and south, this line of demarcation exists between the well-watered plains to the eastward, and the more arid regions separating them from the Rocky Mountains. To the north, the line deflects eastward, and to the south it diverges to the west, so that a greater portion of Nebraska is dry and unproductive than of Kansas; while Kansas, taken as a whole, is less fertile throughout than the Indian territory south of it.

There are places where this dry belt is very narrow, and were it absolutely desirable for a trans-continental railroad to avoid it altogether, and to pass all the way to the Rocky Mountains through land capable of continuous cultivation, either with or without irrigation, this might easily be accom-

plished by leaving the present road at Salina, or Fort Harker, crossing direct to the Arkansas River, following it to New Fort Lyon, and then continuing up the Purgatoire into New Mexico. It is, however, often considered better to make short cuts, than to keep too persistently to the fertile valleys.

Some dozen miles from Fort Hayes, as I have said, we began to enter this impoverished country, and as we advanced day

Mushroom Rock.

by day, the marks of less frequent rains left their impress on the mineral, as well as on the vegetable kingdom. The country was not so well rounded off into rolling prairie; the bluffs stood out more sharp and bold; and the effects of floods and freshets were more distinctly visible. These are appearances which always increase with the dryness of the region. In a great many instances, the soft, dry land had, in process

of time, been washed away from the harder foundations, leaving the latter standing on the open plain as grotesque masses of sandstones, marls, &c.

Many of these were named, and formed good land-marks; such were Castle Rock, Monument, Carslile, Hall, Chalk Bluffs (not made of chalk, however), and others all along the route. Their average height above the plain was from 100 to 300 feet.

The most singular of these formations is that met with about six miles east of Fort Harker, and known as Mushroom Rock. The engraving is an exact representation of it.

The worst part of the route was from Donner Station, twenty miles west of Hayes, to within twenty miles of Fort Wallace, a district of about sixty miles across, and even over this sixty miles there was no lack of forage; and in many places very fair grazing could be had, suitable either for sheep or for horned cattle. On nearing the Rocky Mountains the rain-fall gradually increases. Along its eastern spurs it is pretty abundant, producing a good growth of hardy and nutritious grasses, amongst which may be noticed the mountain bunch-grass, as well as the grama (*Boutelorea oligastuchya*), both most excellent for cattle.

Early in March I found the cattle actually fat; they had been out all winter, without shelter or hay, and the frost was still in the ground. I am now speaking of the country between Fort Wallace and Denver, and north of Denver, towards the Black Hills. I may add, however, that the entire belt of country along the spurs of the mountains, especially to the southward, cannot, except in New Mexico, be surpassed by any other region for purposes of sheep farming.

Almost due west of Fort Wallace, a considerable spur from the mountains juts out into the plains. This spur is

thickly covered with fine pine timber—a treasure almost beyond price in such a region; and, curious enough, while the timber grows above, a fine bed of coal lies below the surface. This forest is entered about one hundred and eighty miles from Fort Wallace, and extends for at least forty miles up into the mountains.

Whether it is that the timber attracts an additional quantity of moisture, or prevents it from evaporating when deposited, or whether the soil is unusually rich, I know not; but I can say of my own knowledge, that in this district vegetation is very luxuriant, and the country very beautiful. Along the streams flowing from the mountains around Denver and south of it, fine crops and vegetables can be raised by irrigation; but as the altitude of these regions is very great (about 6,000 feet), crops do not flourish much farther north at that elevation. As only a small proportion of these streams on leaving the mountains succeed in crossing the comparatively dry part of the plains, and as the few which do not sink flow for one or two hundred miles with much-diminished volume, I fear that but little irrigation can be obtained from them, and I am decidedly of opinion that, without irrigation, crops cannot at present be raised.

This leads naturally to a very important question. As settlers advance from the East; as they sow corn, plant trees, and open up the soil, will the rain-fall increase to any considerable extent? The knowledge gained from many places in the Western country, where farming on a large scale has already existed for years, leaves no doubt now, that this question can safely be answered in the affirmative. The district around Salt Lake is the most striking example I have met with; here, since cultivation has extensively been carried on, the rain-fall has been

nearly doubled, and during months which used always to pass by with cloudless skies, reviving showers are of frequent occurrence, and heavy dews refresh the ground. We may confidently expect, therefore, that the area of arable land on these vast plains will gradually increase, and that the dry belt of country will become narrowed indefinitely, by the skill and industry of the husbandman.

June 23. At sunset, on this Sunday evening, unusual activity might have been seen in our camp. We had crossed the Smoky Hill Fork for the last time, and had pitched our tents on its banks, in a spot known as Death Hollow. The name was not a prepossessing one, but so many trains had been attacked there, and so much life had been taken on that piece of bottom-land, that it was, at all events, appropriate. Trains which camped there, it was said, were sure to be attacked; there were, however, three most tempting inducements to remain — abundance of wood, water, and grass.

On one side were the bluffs, which abruptly separated the depressed valley from the general level of the plain. On the other flowed the stream, its banks clothed with willow, cotton-wood trees, and tall rank grass; beyond were the bluffs of the opposite side, lying pretty close to the river. About a mile farther up the stream, on a carpet of the greenest grass, beneath a cluster of large cotton-wood trees, the bleached skeletons of a great many buffalo lay altogether, showing that this place had been a favourite camping-ground for Indian hunting parties.

At seven o'clock we were roused from our languid enjoyment of the cool evening breeze and the glorious sunset, by two or three shots fired in quick succession from the plains, and one return shot from our sentinel on the bluffs, who ran

directly into camp crying "Indians! Indians!" In a moment we were ready, with our Spencer carbines in our hands; but we heard no war-whoop—saw no enemy. Two large objects, however, quickly came in view, which soon developed into two stage-coaches, covered outside with soldiers and their rifles. These soldiers had mistaken our men on the bluffs for Indians, and had fired at them, at which our escort, who were mostly recruits and unaccustomed to being made targets of, thought that their end had come, and that the Indians were upon them "sure."

Not much was said about the mistake, for both sides were a little ashamed of it, and our great desire was to hear the news. It was the old story, but rather worse than usual. Nearly a week before, the coaches had left Fort Wallace, and had tried to run the gauntlet together to Denver. On the 17th, however, before they had travelled more than thirty miles, they were attacked by a band of 200 warriors, all mounted and well armed. Unable to go farther, they tried to retrace their steps, and had a running fight with the Indians for eight miles, when the savages, after losing several comrades, gave up the chase. Two soldiers and one civilian were killed, and their bodies left on the road; two of the guards were wounded, and Mr. Blake, of Philadelphia, who had come out with the excursion party, and was on his way to Denver, had been shot in the shoulder. He was sufficiently recovered, however, to leave Fort Wallace that afternoon, and commence his homeward journey. From him we received a description of the fight. The stages had started eastward two days previously, and been driven back to the fort; but with indomitable perseverance, they had tried again, and this time successfully.

That night we dug rifle pits around our camp; and long

shall I remember discussing with my companion of the watch as we sat together in one of them, whether a light that appeared suddenly over the opposite bluff was an Indian signal or only a star. The coyotes howled dismally all through the night, and at daybreak joined in a chorus of such unearthly yells, that some of the knowing ones in Indian warfare declared that these coyotes had no tails, but faces like red-men, and teeth made of lead.

Next day we entered Fort Wallace, and found the little garrison quite worn out by the dangers and anxieties of the last few days. I shall, however, leave it to my friend, Major Calhoun, who had previously arrived with General Hancock and his staff, to recount what had transpired before our arrival, in a fresh chapter.

The Major and I became great friends at Fort Wallace; although my junior in years, he looked a middle-aged man, for he had gone through hardships during the civil war which few men could have survived. He had been shot through the lungs, had lost a leg, and had been thrice taken prisoner; worse than all, he had lingered for eighteen months in the dungeons of a Southern prison. Twice he tried to escape across the swamps of the Chickahominy, and twice he was recaptured and brought back to expiate that offence by greater sufferings and more acute starvation. At last he succeeded, shoeless and in rags, in breaking through the lines and reaching the Northern piquets in safety, where he learned that he had already been exchanged. The bracing climate of the Rocky Mountains did wonders for him, and soon he was able to go through as much fatigue as the strongest amongst us.

CHAPTER V.

A FORTNIGHT AT FORT WALLACE.

General Hancock arrives at Fort Wallace, June 16.—First Indian Assault on the Fort, June 21.—Attack on the Quarries.—The Garrison worn out.—A quiet Sunday.—False Alarm.—Arrival of General Wright and party, June 24.—The Mail-bags.—Second Indian Attack, 25th.—The Fight.—The Mutilated Dead.—Wonderful Recoveries.—Pond Creek Station.—Detained a Fortnight at Fort Wallace.—General Hancock returns from Denver.—He cannot give us any more men.—Proceed in company with Colonel Greenwood and Party.

"At sunrise on Sunday, the 16th, General Hancock and escort broke camp fourteen miles north-east of Fort Wallace.

Fort Wallace.

"Winding down from the dividing ridge, about 9 A.M., a cheer came from the head of the column. Riding out, I saw in the distance the white tents and long reddish buildings of Fort Wallace. Glad, indeed, were we to see human habitations; and in the bright sunlight Fort Wallace looked like a beautiful little village, nestling on the far-off hill-side. We passed large beds of flowering cacti on our way down, and the lower ground appeared to be one mass of waving flowers. Though the fort seemed to be but a very few miles off, we really found it seven, so clear is the atmosphere in this region. About 600 yards from Fort Wallace we went into camp, and soon all were busy in washing themselves, and donning apparel more befitting the Sabbath-day and rest. We had been in camp but a short time, when Captain Kehoe, of the 7th Cavalry, the commandant of the post, Adjutant Hale, Lieutenant Bell, and other officers, came down to welcome us. Fort Wallace is situated on Pond Creek, the south branch of

the Smoky Hill River, and about ten miles south-west of the present terminus of the Kansas Pacific Railroad. It was called after General Wallace, and is two miles from the present Pond Creek Station. There is accommodation here for 500 men; but, owing to the constant Indian depredations, the troops that should be at the fort are scattered in small parties over the roads between Fort Hayes and Denver, vainly trying to protect the overland stages from the attacks of the savages.

"Colonel Greenwood, his little party of twenty engineers, and a small escort of twenty-five coloured troops, had just completed the survey for the railroad up to this point. Their destination was Denver, 200 miles distant, to which town they intended making a preliminary survey for a branch line; but the Sioux and Cheyennes had harassed them so much that they were obliged at last, after losing thirteen mules, to come into the fort to refit, and to obtain, if possible, a stronger escort.

"On the Friday after our arrival General Hancock started for Denver. The people there were in great distress, and were calling out loudly for help; provisions were becoming scarce, prices enormous, and trade almost at a stand-still; for communication with the East had been almost entirely stopped by the Indians. Wagon trains had ceased either to arrive or to leave, and the mining population in the adjoining districts, dependent entirely upon supplies from the East, were even in a worse condition than the traders of Denver.

"Captain Kehoe, and far more troops than could well be spared from Fort Wallace, accompanied the General, leaving behind only about fifty fighting men, as many civilians, and Colonel Greenwood's little escort of twenty-five coloured troops, to guard the post. Such was the state of affairs when, on the

next morning (Saturday 22nd), in company with Lieutenant Beecher (post quarter-master) and four cavalry men, I went down to Colonel Greenwood's party, who were making a survey of the Government reservation around Fort Wallace. On our way back we ascended a hill which brought us in full view of the fort; there we saw men rushing across the plain in apparent excitement, and just beyond, a large number of mounted warriors were dashing back and forth on their horses. This was accompanied by the rattle of musketry. With a cry of 'Indians!' Beecher galloped on, and it did not take us many minutes to come within rifle-shot of the 400 Indians who were encircling the fort.

"I was mounted on Lieutenant Bell's horse, but he met me outside the fort, and, on my dismounting, jumped into the saddle, and galloped directly for the enemy, which a small body of twelve cavalry men was holding in check. I secured the horse of a wounded man, and, anxious to see how the 'noble red-men' fought, I rode to the front. Here I found a number of wounded men, and an irregular line of soldiers and civilians on foot; while the mounted men, under Lieutenant Bell, were in the advance, skirmishing with the Indians. On the left of the little line of battle, a body of some fifty Indians rushed forward just as Sergeant Dummell, with ten men, appeared over the hill from the fort. Shouting to his men, three of whom followed him, the gallant fellow plunged in amongst the Indians; and for a few minutes the yells of the savages, the rattle of 'Spencers,' and the encouraging shout of the young sergeant, could be heard. Before assistance could reach them, the Indians were reinforced, and the devoted little band were trampled under the feet of the Indian horses. After the soldiers had fallen, the brutal Indians fired on them, and speared them. They were about scalping them, when

the remainder of our little force rushed to the rescue, and the red-men fell back, carrying with them their own dead and wounded, and the horses and equipments of Dummell's men. All the fallen men were recovered, with one exception. This poor man's body lay hidden for some minutes by an undulation in the plain; but on being discovered by a civilian, a rush was immediately made towards the corpse. It was safely secured before the savages had succeeded in taking the scalp, and carried to an ambulance which had been sent out for the wounded.

"Fearing an attack directly on the fort, Adjutant Hale called in all the men on foot and posted them, so as to be ready in case the Indians made an united assault. The latter showed a great deal of their accustomed bravado. For instance, a band of ten or twenty rushed out of their irregular line, brandishing their spears, and whooping all the time; then, wheeling rapidly, they fired, and ran back to their comrades, while our carbiniers made the atmosphere very hot about their ears.

"Lieutenant Bell was well mounted, and riding close to the Indians to ascertain their force, a man on a white horse galloped out of the line, as if to court combat. Bell, however, kept on, at which the Indian jerked in his horse, fired, and galloped back. This man led on the Indians in their first rush. He is believed to be a half-breed, son of Colonel Brent, by a Cheyenne wife. He is twenty-four years of age, and disowned by his father. He shows his affection for him by swearing he will shoot him at the first opportunity, and wear his father's scalp in his belt.

"I was somewhat surprised to see the regularity of the Indian advance when they made their last dash. Leaving their main body dismounted in line, 'standing to horse,'

thirty were moved forward, and deployed as skirmishers, at distances of two paces. But after coming within range of our carbines, they changed their minds and returned.

"I must say I felt glad when I saw Colonel Greenwood's coloured troops forming to the rear, though their advent nearly resulted in my own death. I was galloping towards the ground upon which the black men were posted, when I heard a whiz! whiz! whiz! close to my ears, and looking up, I saw the sergeant taking aim at my head. He was close to me, and I mildly insinuated that his conduct was not at all pleasant. He replied, 'Gosh! I was gwine for yeh—thought yeh was an Ingin, shuah!' I need not assure you that I did not take the negro's remarks in a complimentary sense, and I particularly objected to his manner of presenting them. When I returned to camp, I borrowed a glass; and as I saw my long black hair, brown silk shirt, brigandish cavalry hat (Captain Kehoe's), and generally demoralised appearance, I changed my mind about going down to Greenwood's camp to 'demand an explanation.' Even my mother might have made the same mistake.

"About three miles from Fort Wallace, and at the foot of a long range of hills which partly surround it, are situated the quarries from which the stone is procured for the buildings now being erected. Six teams are employed in hauling the stone, and some thirty men in getting it out. The labourers have tents, and remain at the quarry.

"Simultaneously with the Indians' appearance in front of the fort, a large body made a dash at the teams, two of which were near the quarry. One succeeded in getting in; but the other, in full view of all, was overpowered, and the driver, Patrick McCarty, cut down. It was astonishing to see the rapidity with which the Indians cut loose the mules and ran

them off, after which they upset the wagon. Owing to the fire kept up by the men in the quarries, they did not scalp the teamster. Seeing a movement on the part of the men in the quarries to evacuate, our little handful of mounted men galloped over to head off a body of Indians who were riding for the labourers. In this we were successful; but the quarries had scarcely been evacuated ten minutes before the Sioux and Cheyennes had taken possession of them, and set the works and huts on fire. Our loss that day was eight men—four killed and four wounded—the latter, I regret to say, severely.

"There was but little sleeping in Fort Wallace on Saturday night. Every man was needed, and there was an air of determination about the men which led me to believe that if the Indians assaulted the fort that night, their success would be purchased at a terrible price. Every man was armed. Lieutenant Lea, stationed here temporarily, was very active, and did much towards giving the men confidence.

"A calm Sunday followed the storm. We buried the poor fellows that had been killed the day before in the little graveyard, by the side of their comrades, not one of whom had died a natural death.

"There was no rest, however, for the little garrison, nearly broken down with arduous guard and picket-duty. Every hour the horizon was closely scanned; not a tall tuft of grass moved in the distance, not an antelope bounded over the plain, that was not noticed by the sentinel.

"The next night passed quietly by, and no fresh attack was made. At 10 o'clock in the morning, however, a column of dust was seen rising seven miles off to the eastward. That was the direction the Indians had taken. They might be returning to renew the fight. So, quicker than it takes to

tell it, the little band stood ready with arms for an enemy and hands for a friend. The column of dust approached. Then a long line came over the hill, four miles distant. The bright sun shone on the white covers of the wagons, and was reflected from the shining barrels and glittering scabbards of the advancing cavalry. No Indians ever approached in that slow, solid step. So a thrill of pleasure ran through all

Arrival of the Mails at Fort Wallace.

as Adjutant Hale, from 'the look-out,' on the roof of the sutler's 'store,' announced the approach of General Wright and his surveying party, with a large cavalry escort."

* * * * * *

While friends were clasping hands in warm welcome and overflowing with questions, a second pleasure was in store for us all. Scarcely were the tents pitched and the mules let

loose to roll on the grass and play in the serio-comical manner peculiar to the race, when two coaches from the East brought us the first mails we had received since starting. The bags were carried into the little mail-room, and their contents emptied out upon the floor. Most of us found our names amongst the pile. How sweet the news from far-off Philadelphia and dear old England none can appreciate who have not felt it for themselves. So all went merrily on through the day. The officers were most hospitable; we spent the evening at their quarters, and retired to our tents thoroughly contented with ourselves and at peace with all men.

Peace did not last long, however, for early dawn brought the red-skins back again. They were evidently ignorant of the fresh reinforcement, and came determined this time to take the fort and repeat in all its horrors the Fort Kearney massacre. Pond Creek Station was the first point of attack; but, as usual, this little fortress—for in fact it was quite a stronghold in its way—proved too much for them. They succeeded in stampeding four of the stage-horses; and almost the first intimation received at the fort of an attack was brought by these horses galloping straight towards us, two-and-two, exactly in the same order as they were accustomed to be driven. One was bleeding from a wound in the hind leg, another had been shot in the neck. The Indians followed on their horses, whooping and yelling like a host of demons. Without a moment's delay, a dozen cavalry from the fort, united with some thirty-five of our escort, and led by our officer, Captain Barnitz, were in the saddle. The bugle sounded, and out they went across the open plain.

The Buffalo Indians are probably the finest horsemen in the world. Accustomed from their childhood to chase the

buffalo, they live half their time in the saddle. No reins are used to guide their horses, but they press with their heels on whichever side they want to turn. Both hands and arms are consequently free to use the rifle, the bow, or the spear at pleasure. These men were splendidly armed with rifles for long ranges, bows and arrows for short distances, and spears and tomahawks for hand-to-hand combat. They were tightly strapped to their saddles, so that they could bend down at either side of the horse, and completely hide their bodies from view as well as from the bullets of the enemy; and when shot they did not fall to the ground, but were carried off the field by their ponies, unless the latter were disabled also.

Leading on the red-skins could distinctly be seen the tall warrior with the long lance on the white horse, who was so conspicuous in the fight of Saturday. As the little column advanced, the Indians commenced signalling by walking their horses in a circle, while the chief made signs to some warriors out of view by means of a shining instrument or mirror, which flashed brilliantly in the sun. The savages had evidently not expected to find so large a body ready to meet them, or to see an additional line of tents and wagons added to the fort. All this signalling seemed to result in the gradual withdrawal of the attacking party from the immediate vicinity of the fort behind a ridge some two miles distant, where, as it turned out, a much larger number were waiting in concealment. At the first cry of "Indians!" we were all out of our tents, rifle in hand. My friend, Walter Hinchman, Criley, our carpenter, and myself, started immediately for a ravine about two miles off on the right, which formed a covered approach of six miles or more in length leading in the direction of our camp. General Wright very

wisely detained the rest of the party in camp to defend it in case of attack while the cavalry were away. Finding no Indians advancing along the ravine, we returned to breakfast, feeling it undesirable to go farther unprotected and alone. Two hours of great suspense followed, which was not much relieved by the appearance of a horseman from the field of action, who came to get an ambulance for the dead and wounded.

The following is an account of this engagement:—

No sooner had the cavalry followed the retiring band beyond the ridge, exchanging shots and skirmishing all the way, than on either flank two fresh bodies of warriors suddenly appeared. They halted for a few minutes; a powerful-looking warrior, fancifully dressed, galloped along their front shouting out directions; and then, like a whirlwind, with lances poised and arrows on the string, they rushed on the little band of fifty soldiers. The skirmishers fired and fell back on the line, and in an instant the Indians were amongst them. Now the tide was turned. Saddles were emptied, and the soldiers forced back over the ground towards the fort. The bugler fell, pierced by five arrows, and was instantly seized by a powerful warrior, who, stooping down from his horse, hauled him up before him, coolly stripped the body, and then, smashing the head of his naked victim with his tomahawk, threw him on the ground under his horse's feet. On the left of our line the Indians pressed heavily, cutting off five men, among them Sergeant Frederick Wylyams. With his little force, this poor fellow held out nobly till his horse was killed, and one by one the soldiers fell, selling their lives dearly. The warrior who appeared to lead the band was, up to this time, very conspicuous in the fight, dashing back and forth on his grey horse, and by his actions setting an example

to his warriors. In the *mêlée*, however, one of our cavalry men was thrown to the ground by the fierceness of the Indian onslaught, when this leader, who I have since learned was the famous Cheyenne war-chief Roman-nose, attacked the prostrate man with his spear. Corporal Harris, of "G" company, was near him, and struck Roman-nose with the sabre which he held in his left hand. Quick as thought, the chief turned on him; but as he did so, the faithful "Spencer" of the corporal met his breast, and with the blood pouring from his mouth, Roman-nose fell forward on his horse, never again to lead his "dog-soldiers" on the war-path. By this time it was more than evident that on horseback the soldiers were no match for the red-skins. Most of them had never been opposed to Indians before; many were raw recruits; and their horses became so dreadfully frightened at the yells and the smell of the savages as to be quite unmanageable. So Captain Barnitz gave the order to dismount.

When the dismounted cavalry commenced to pour a well-directed volley from their Spencers, the Indians for the first time wavered, and began to retire. For two hours Captain Barnitz waited with his thinned ranks for another advance of the Indians, but they prudently held back; and, after a prolonged consultation, retired slowly with their dead and wounded beyond the hills, to paint their faces black, and lament the death of one of the bravest leaders of their inhuman race.

I have seen in days gone by sights horrible and gory—death in all its forms of agony and distortion—but never did I feel the sickening sensation, the giddy, fainting feeling that came over me when I saw our dead, dying and wounded after this Indian fight. A handful of men, to be sure, but

with enough wounds upon them to have slain a company, if evenly distributed. The bugler was stripped naked, and five arrows driven through him, while his skull was literally smashed to atoms. Another soldier was shot with four bullets and three arrows, his scalp was torn off, and his brains knocked out. A third was riddled with balls and arrows; but they did not succeed in getting his scalp, although, like the other two, he was stripped naked. James Douglas, a Scotchman, was shot through the body with arrows, and his left arm was hacked to pieces. He was a brave fellow, and breathed out his life in the arms of his comrades. Another man, named Welsh, was killed, but all subsequent search failed to discover his remains. Sergeant Wylyams lay dead beside his horse; and as the fearful picture first met my gaze, I was horror-stricken. Horse and rider were stripped bare of trapping and clothes, while around them the trampled, blood-stained ground showed the desperation of the struggle.

I shall minutely describe this horrid sight, not for the sake of creating a sensation, but because it is characteristic of a mode of warfare soon—thank God!—to be abolished; and because the mutilations have, as we shall presently see, most of them some meaning, apart from brutality and a desire to inspire fear.

A portion of the sergeant's scalp lay near him, but the greater part was gone; through his head a rifle-ball had passed, and a blow from the tomahawk had laid his brain open above his left eye; the nose was slit up, and his throat was cut from ear to ear; seven arrows were standing in different parts of his naked body; the breast was laid open, so as to expose the heart; and the arm, that had doubtless done its work against the red-skins, was hacked to the bone;

his legs, from the hip to the knee, lay open with horrible gashes, and from the knee to the foot they had cut the flesh with their knives. Thus mutilated, Wylyams lay beside the mangled horse. In all, there were seven killed and five wounded.

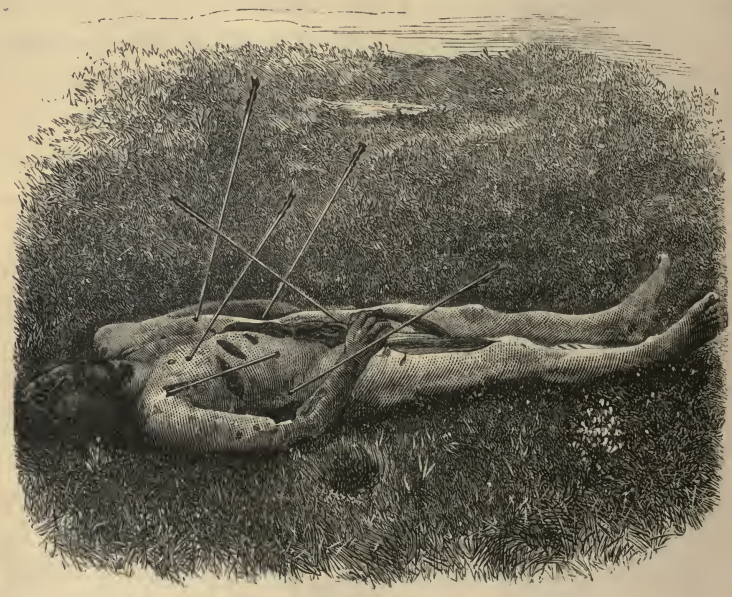
As I have said, almost all the different tribes on the plains had united their forces against us, and each of these tribes has a different sign by which it is known.

The sign of the *Cheyenne*, or "Cut arm," is made in peace by drawing the hand across the arm, to imitate cutting it with a knife; that of the *Arapahoe*, or "Smeller tribe," by seizing the nose with the thumb and fore-finger; of the *Sioux*, or "Cut-throat," by drawing the hand across the throat. The *Comanche*, or "Snake Indian," waves his hand and arm, in imitation of the crawling of a snake; the *Crow* imitates with his hands the flapping of wings; the *Pawnee*, or "Wolf Indian," places two fingers erect on each side of his head, to represent pointed ears; the *Blackfoot* touches the heel, and then the toe, of the right foot; and the *Kiowa's* most usual sign is to imitate the act of drinking.

If we now turn to the body of poor Sergeant Wylyams, we shall have no difficulty in recognising some meaning in the wounds. The muscles of the right arm, hacked to the bone, speak of the Cheyennes, or "Cut arms;" the nose slit denotes the "Smeller tribe," or Arapahoes; and the throat cut bears witness that the Sioux were also present. There were, therefore, amongst the warriors Cheyennes, Arapahoes, and Sioux. It was not till some time afterwards that I knew positively what these signs meant, and I have not yet discovered what tribe was indicated by the incisions down the thighs, and the laceration of the calves of the legs, in oblique parallel gashes. The arrows also varied in make and colour,

according to the tribe; and it was evident, from the number of different devices, that warriors from several tribes had each purposely left one in the dead man's body.

I had made the acquaintance of poor Sergeant Wylyams only the day before. He was an Englishman, educated at Eton, and of good family, but while sowing his wild oats, he had made a fatal alliance in London, and gone to grief. Dis-



The Mutilated Sergeant.

owned by his family, he had emigrated to America, joined the army, and was daily expecting promotion out of the ranks.

The day on which he was killed he had promised to help me in printing off some copies of the photographs which I had taken on the way. I had to print off my negatives alone, and to take a photograph of him, poor fellow, as he lay; a copy of which I sent to Washington, that the authorities

should see for themselves how their soldiers were treated on the plains.

These Indian troubles detained our party nearly a fortnight in idleness at Fort Wallace. The hospital tents were crowded, and I must say that I never saw better surgery or more careful management than here, under the hands of Dr. Turner, the medical officer of the post. Two cases he was especially proud of, and certainly with reason. One was a Mexican, the other a soldier; both had been shot through the body, by an arrow. They both recovered without a bad symptom. The soldier I watched from the extraction of the arrow until he was able to walk about. The arrow had entered the back two inches from the spine, and the point had reappeared just below, and about two inches from, the navel. It had, probably, passed quite through the liver, without touching any other organ; still, four layers of peritoneum must have been pierced, and the recoveries, in both cases, say as much for the healthiness of the climate as for the skill of the surgeon.

General Wright did not think it advisable to leave Fort Wallace with so small a force to guard it. His chief reason, however, for remaining, was the hope of obtaining a larger escort for himself on General Hancock's return from the West. As, however, we were splendidly armed, had abundance of ammunition, and were supplied by the Government with every necessary in order that the Indians should not succeed in stopping or delaying us, this inactivity was by no means popular with the majority of the party.

One day I examined Pond Creek Station, and as it is a very good specimen of one of those fortified stage stations which are to be found along the overland routes, a short description may not be uninteresting.

Standing side by side, and built of wood and stone, are the stables and the ranche in which the drivers and the ostlers live. Behind is a coralle, or yard, divided off from the plain by a wall of stones. In this is kept the hay, &c., belonging to the station. A little subterranean passage, about five feet by three, leads from the stables to the house. Another one leads from the stables to a pit dug in the ground, about ten yards distant. This pit is about eight or ten feet square, is roofed with stone supported on wood, and just on a level with the ground portholes open on all sides. The roof is raised but little above the general level of the ground; more, however, at this station than at most of them. Another narrow subterraneous passage leads from the house to a second pit, commanding the other side of the station; while a third passage runs from the coralle to a larger pit, commanding the rear. In both houses, many repeating Spencer and Henry breech-loading rifles—the former carrying seven, and the latter eighteen charges—lie loaded and ready to hand; while over each little fort a black flag waves, which the red-men know well means "no quarter" for them. When attacked, the men creep into these pits, and, thus protected, keep up a tremendous fire through the portholes. Two or three men, with a couple of breech-loaders each, are a match for almost any number of assailants. I cannot say how many times these little forts have been used since their construction, but during the three weeks we were in the neighbourhood, the station was attacked twice. The Indians are beginning to understand these covered rifle-pits, and the more they know of them the more careful they are to keep at a respectful distance from them.

At the close of the following week General Hancock

arrived. He had left so many of his escort here and there along the road, that no additional troops could be spared for us; and our expedition might have ignominiously returned at its outset, had not Colonel Greenwood most liberally offered to escort us with his surveying party and his coloured troops—making, in all, nearly fifty additional men—across the remainder of the country considered unsafe.

CHAPTER VI.

CROSSING THE DESERT BETWEEN THE SMOKY HILL FORK AND THE ARKANSAS RIVER.

Leave Fort Wallace.—How the Surveyors "Run a Line" on the Plains.—First Night.—Second Day, find Buffalo and Water.—Third Day, Twenty three Miles of "Line" surveyed.—No Water, Sufferings of the Animals.—Miseries of a Dry Camp.—Reach the Valley of the Arkansas.—Excitement of the Horses and Mules on reaching the Water on the Fourth Day.—The Valley, Fertile but Uninhabited.—We follow the Stream for Forty-two Miles to New Fort Lyon.—Ruined Forts passed *en route*.—Reach New Fort Lyon, July 14th.—The Building Stone.—First Glimpse of the Rocky Mountains.—A Hunting Party arrive.—Threatened with Cholera.—Spread of the Epidemic over the Plains.

Distance travelled 114 *miles.*

The country between Fort Wallace and the Arkansas River was very little known; no road traversed it, and no one ever crossed it but the hunter and trapper, and they but rarely. It was thought to consist of an undulating plain covered with buffalo grass, and to be almost entirely destitute of water. The best maps of that section of country had placed one stream, "Sand Creek," between the head waters of the Smoky Hill Fork and the Arkansas River; but this was reported to be only an arroyo, usually dry. General Wright's wish was to cross this country obliquely, and strike the Arkansas River either at or a little below New Fort Lyon, a post then being formed at the mouth of the Purgatoire, one of the southern tributaries of the Arkansas River. The distance was estimated at about seventy-two miles, and as no guide could be obtained, the imperfect maps of the country had alone to be relied upon to direct our course.

From the great bend of the Missouri at Kansas City, to Fort Wallace, we had gradually been ascending, until at the Fort we were 3,275 feet above the sea, so that, as the elevation of the Missouri at Kansas City is 710 feet, the average rise per mile is 6·2 feet for the distance of 412 miles.

On Monday, the 8th of July, before the sun had risen, and in a thick mist (the only one I ever saw on the plains), our line of wagons crept away from Fort Wallace, first fording the stream, and then winding about through the cliffs and broken country which separate the valley on the south side from the more lofty plateau beyond. Two days previously, the line of survey had been run across this country for six miles, so that, as soon as our wagons came to the end of this line, the engineer corps commenced work, and continued it onward as fast as possible.

Monday, July 8.

The ground had to be measured, stakes driven in at regular intervals, and every undulation of the surface had to be accurately determined by means of proper instruments; and this had to be done through an Indian country, which was, moreover, so dry that it was probable we should not find a drop of water along the whole seventy-two miles. The greatest possible expedition was therefore required on the part of the surveyors, and their achievements across this country were really wonderful. There were under General Wright, at that time, three parties or divisions, each capable of "running a line" independently. At Fort Wallace, the transit-man, leveller, and topographer of each division, had obtained mules, and one of the wagons had been emptied of its contents, and devoted, for a time, to the surveyors. One division commenced work, and the men were soon spread out

into line a mile long, upon the plain, measuring and taking observations at every point. On one side of this line came the wagons, following each other closely, and guarded by a small body of the escort. The remainder of the cavalry moved with the surveyors—some in front, others in the rear, and the greater number in the centre, so that, being between this body of cavalry and the wagon train, the long line of surveyors was well protected. The transit-man, carrying his instrument on his shoulder, and riding a mule at a gallop, would suddenly stop, jump off, arrange the transit, wave to the flag-man ahead, wait until satisfied of the correctness of his observation, then back into the saddle, shoulder his transit, and gallop away again. Behind him came the rod-men and levellers, mounted in the same way, and advancing with a like rapid accuracy. It was very hard on the mules, but by five o'clock that evening fifteen miles had been chained, "located," and levelled—no chance nor guesswork, but an accurate preliminary survey.

Under a July sun this activity could not possibly be kept up indefinitely; so, about every two hours, when one party was tired, those in the emptied wagon would relieve them, while the men who had been working would get in and rest. In this manner the day passed by, and evening came. After working until it was too dark to see any longer, we halted; and, too tired for the most part to pitch tents, threw our blankets on the ground, and soon fell asleep. Our day's march was twenty-one miles, but of these, six had been surveyed before.

About mid-day we had passed two pools of stagnant water, left after the rains. All the animals were supplied from these, so that they did not suffer much from thirst during the night. It was, however, a miserable camping ground, on

the dry bed of a creek; the grass was scant and poor in quality; and all the mules had to be tied to the wagons, both for safety and for fear of their straying back to the last watering-place.

During the next day our tired animals toiled along over the endless undulations of the dreary, arid plain; occasionally crossing dry water-courses, but nowhere was there a drop to drink. About five o'clock, far away on the horizon, a number of black specks came in view. At first, even with the glasses, we could not make them out; though they were evidently moving and coming towards us. In half an hour we could plainly see that they were a herd of over one hundred buffalo. At this sight our hopes of finding water were greatly revived; for at eventide so large a herd would certainly not be found far from it. I could not resist a chase, although early that morning I had had a successful one. On my way towards the herd I saw evidence of a heavy local rain, and on my return found our party camped within half-a-mile of some large pools of water. Since morning we had travelled twenty-one miles, and the engineers had surveyed "a line" the whole of the way.

In a very few minutes our clothes were thrown off, and, like shouting school-boys, we were splashing each other in the sparkling water. These pools were all transitory, and probably in less than a week afterwards had disappeared into the sandy soil.

Long before the streak of pink and gold, so beautiful in this region, had begun to appear in the east, the heavy sleepers were roused. By five o'clock the engineers were at their transits and levels; and as General Wright was desirous that the train should accompany the surveyors, the unfed animals were slowly pulling the wagons through the yielding earth. As the day advanced, the mules of the engineers began to give

out; still the party, both mounted and on foot, kept bravely on through the scorching heat, until twenty-three miles of the desert had been staked, levelled, and chained. By this time the sun was setting; and the hot wind coming from the south, sent up clouds of dust. As no "Sand Creek" came across our path, I started on a-head about four o'clock with the chief wagon-master to search for it, and, if possible, to find water to camp by. We kept a little to the right, and after a ride of ten miles came to a broad arroyo, or dry bed, which we thought might be "Sand Creek." This we followed for four miles; but not finding a trace of water, returned at sundown to camp. Two or three tents were being pitched, while several of the party, from the top of a lofty undulation, were intently viewing through their glasses a distant row of trees, and a long silver thread, winding away to the eastward. Could it be water, or only a mirage? Perhaps a bank of shining sand in some dry water-course!

As the setting sun lit up the horizon, there seemed to be no doubt, from its breadth, that, if it were water, it must be the Arkansas. General Wright consulted his maps, and concluded that this was impossible, as the Arkansas River could not be less than thirty-two miles distant. So we halted for the night. All our stock were suffering terribly for want of water. The horses stood motionless on three legs, with ruffled coats and drooping necks, now and then snuffing the dry parched grass, and refusing even to look at their corn. The mules, as is their wont, did manage to eat up their corn, but they made the night hideous with their frightful cries. A hundred mules uniting their voices at intervals in chorus, louder and more frequent as the night changes into morning; kicking at each other and rattling their chains, in vain efforts to escape and quench their burning thirst: these form perhaps the most diabolical

combination of sounds that ever broke the slumbers of a worn-out traveller. Such was the conclusion I came to, as I watched with impatience the first streak of day.

Four miles of travel next morning solved the question of the previous evening. From the top of our "Mount Pisgah" we had indeed seen "the promised land," the rich valley of the Arkansas, the wooded shady banks, the islands of cotton-wood trees, and the shining

Thursday, July 11.

Striking the Arkansas.

river. Three hours after daylight our horses were wading through a sea of long rich grass, and snorting with excitement as they smelt the water. As for the mules, they were quite unmanageable. With difficulty the teamsters prevented them from rushing straight into the river with the wagons behind them; and when once unyoked, each team, regardless of

harness, with outstretched necks, and white with dust, plunged *en masse* straight down a bank 3 or 4 feet deep, and buried their heads in the water. The rapid current carried some of them off their legs, but they did not care for that, and scrambled ashore where best they could. Their thirst quenched, and their bodies refreshed, they set to work at the grass. Slowly and steadily they "crowded it down," as our teamsters remarked, until their sides bulged out to such a degree that it was evident they could hold no more.

It was delightful to see a broad stately river again, with its family of trees and waving rushes; and to hear the birds, the insects, and all the little sounds of life that you scarcely notice when you live amongst them, but which you miss so much in the desert; and these seventy-two miles we had just passed over were not only practically a desert, but by no means a good desert for railway purposes. The course we had taken was, so to speak, against the grain of the land; every undulation crossed our line almost at right angles, and would have, "on location," to be cut through. The highest of these undulations, that is, the dividing ridge between the Arkansas and Smoky rivers, was 4,028 feet above the sea; we crossed it sixteen miles from the Arkansas, and fifty-six from the Smoky River.

The Arkansas, at the point where we met it, flowed at an elevation of 3,593 feet above the sea. It is a fine broad stream, with a very rapid current, varying in depth from 10 feet to an inch or two, containing the usual snags, shoals, and quicksands of a Western river, and having an average fall of 7·5 feet per mile. The waters are muddy, but sweet to the taste; the banks consist of the rich loam of the bottom-lands, and are always falling away into the stream, at one side or the other, as the river changes its bed. On which-

ever side the banks are old, large cotton-wood trees grow in considerable numbers; but the side upon which the river is wont to encroach is usually bare, the trees having fallen into the current as the banks gave way. In many places the stream had made for itself an entirely new channel, and the old bed had become a thick tangle of willows, young cotton-woods, reeds, and rushes.

The Santa Fé road, from Fort Harker and Ellesworth, ran along the northern bank; and as all the wagon-trains for New Mexico took this route, from the termination of the railroad, we had no difficulty in finding out our position from the passing teamsters. We were forty-two miles east of New Fort Lyon, and six miles below the mouth of Sand Creek.

The valley on both sides, as far as we traversed it—that is to say, for fifty miles—was most fertile, the grass was of very good quality, and, like all the vegetation, grew most luxuriantly. There was no sign of alkali, nor was the valley anywhere sandy or barren. It varied considerably in width as the bluffs, which formed the edge of the elevated plateau on either side, approached or receded from the river. It seemed curious to us that, for the whole distance I have named, not a ranche, farm, hut, or cultivated patch of land was anywhere to be found. There were no flocks or cattle of any kind to graze upon the beautiful pasture-lands, if we except the few oxen and mules of the passing wagon-trains. All this abundance was going to waste, year after year, from two causes—the presence of Indians, and the absence of railroads.

Following up stream, we passed Bent's Fort, and Old Fort Lyon on the following Saturday, and arrived at New Fort Lyon on Sunday the 14th. Bent's Fort and Old Fort Lyon lie close together. The former is a small square building,

placed on a bluff overlooking the river, and was garrisoned temporarily with about twenty-five men. It was the second military station established by Colonel Bent in former days. The first one, known as Bent's Old Fort, is situated thirty-four miles farther up the river, and is now abandoned.

Old Fort Lyon.

Old Fort Lyon was formerly called Fort Wise. It was of considerable size, and although it had been abandoned only three months, was so completely dismantled as to look like an ancient ruin. Its situation was very unhealthy, being exposed to floods, and infested with rats and rattlesnakes. So a new site was chosen, twenty-two miles farther west (where New Fort Lyon now stands), on an eminence on the north bank of the river. The hill overlooks the stream, is well wooded, and consists partly of a stratum of grey sandstone, very good for building purposes.

July 14.

On our arrival, all the troops were under canvas; but the officers' quarters were nearly built, and a large body of the masons were engaged in quarrying the stone for the privates' barracks, and in preparing it for use. If the present plans are carried out, this will make a very fine military establishment, especially if they continue to build it entirely of stone.

On the third day after our arrival, Captain Barnitz and his company of cavalry, having escorted us to the borders of the military district of New Mexico, retraced their steps to Fort Wallace. With them went Colonel Greenwood and his party. They did not return the way we had come, but directed their course straight for the fort, and surveyed a very good line across the arid region. Transverse ridges did not cross their path; but the country was on the whole quite as barren and worthless as that over which we had passed.

At New Fort Lyon we caught the first glimpse of the Rocky Mountains. For in the clear soft light of sunset, far away to the westward, two broad flat cones were seen to break the hitherto endless level of the horizon. These were the lofty summits of the Spanish Peaks, more than 100 miles distant.

New Fort Lyon.

The day after our arrival, a hunting party of gentlemen arrived from the East. They had had very poor sport on the way, and brought the unwelcome news that cholera had broken out on the plains, and was rapidly advancing westward. The 38th Regiment of coloured troops had been ordered from Fort Leavenworth, in eastern Kansas, to Fort Union, in New Mexico; and just before starting, this terrible scourge showed itself amongst the soldiers. A regiment thus infected, ought certainly not to have been allowed to traverse the country, and spread the contagion; but all efforts to stop it proved of no avail, so that these troops brought death and mourning, first amongst the new towns and settlements and the railway employés along the Smoky Hill River, and then infected Fort Dodge and other places on the Arkansas. In this latter district, the hunting party came in contact with it, and suffered much from choleraic diarrhœa in consequence. While camped at Fort Lyon, the tent of our geologist, and that in which I lodged, happened to be situated next to the new arrivals, and we both suffered considerably from diarrhœa in consequence. In the meantime, the coloured regiment kept gradually approaching; and Colonel Penrose, the post commander at New Fort Lyon, on hearing that they had reached the old fort, sent out a messenger to request that they should not proceed farther. The answer returned was, that daily change of camp was necessary for the preservation of the men, and that the epidemic was fast abating, although, in fact,

they were camped by the burying-ground for convenience-sake. Thus the risk was needlessly run of introducing cholera into the inhabited district of New Mexico. Our parties left, however, before this regiment arrived, and we therefore escaped the serious risk of infection. Gradually, the epidemic was stayed by the careful management of the surgeon in charge, and did not extend farther west than Fort Lyon; but it was very severely felt all through Kansas, and at several points along the Santa Fé trail.

CHAPTER VII.

THE VALLEY OF THE PURGATOIRE.

A Glance of the Country ahead.—The Arkansas Ferry-boat.—Boggs' Ranche, or the First Mexican Settlement.—Its Inhabitants and their Progenitors.—Colonel Bent and his Sons.—Ute Indians.—The Valley almost uninhabited —Its Great Fertility.—Its Fauna.—Land easily Irrigated.—We leave the Valley for the Plateau above.—Bear Rock.—Photographers in Difficulties.—The Great Cañon of the Purgatoire.—Origin of the Name.—We Capture Cattle.—Trinidad.—Lynch Law.—Fighting at Trinidad.

Distance :—In a direct line, 90 miles from Fort Lyon to Raton Mountains.

We left Fort Lyon on the 22nd of July, and camped at the foot of the first range of mountains which barred our westward course on the 4th of the following month, having travelled a distance of about 100 miles. These mountains form the Raton range, and jut out into the plains almost in a due easterly direction from the eastern main chain of the Rocky Mountains: about lat. 37°.

The summits are mostly flat, resembling, at first sight, huge masses of mesa land with steep sloping sides; but on inspection they differ entirely from the latter, being of volcanic origin, and representing a true local range, formed partly by upheaval, and partly by the solidification of molten matter poured out from the earth upon the elevated portions. This basaltic coating does not extend farther than about twenty-five miles east from Trinchera Pass, situated about the centre of the range. Here the mountains become flattened, and prolonged into true mesa country, which extends as an undulating plateau some distance between the heads of the Cimarron and Purgatoire rivers, under the name of the Mesa

del Maia. The Cimarron rises on the eastern and south-eastern slopes of the Raton Mountains, from springs amongst the volcanic rocks; thence it passes over this Mesa del Maia, through which it cuts a channel, forming a cañon known as the Cañon of the Cimarron. The Purgatoire (first changed into Purgatory, and then corrupted into Pickel-Wire) rises in the northern angle which the Raton Mountains make with the main chain. Along the base of those mountains it waters a very fertile valley—the upper valley of the Purgatoire—of variable breadth, and about thirty miles long. The general course is north-easterly. Coming, at length, into contact with, or rather passing over, a northern continuation of the Mesa del Maia, this river, like the Cimarron, forms a cañon, within which it is enclosed for thirty-two miles. On emerging from this defile the river flows more to the northward, through a succession of valleys shut in by bluffs, which represent the abrupt termination of the table-lands on either side, for between fifty-five and sixty miles, when it joins the Arkansas one mile and a half above Fort Lyon. Our course ran parallel to this stream, partly in the valleys, but more generally on the dry level plateau lying to the west of them.

On leaving Fort Lyon the surveyors crossed the Arkansas River about half a mile below the mouth of the Purgatoire, in a boat which had just been built; while the wagons, and those who were mounted, passed over on an eccentric ferry-boat, which an energetic Yankee had established four miles above. By an ingenious system of ropes and pulleys he was enabled to take advantage of the strong current of the river to propel his heavy boat, in either direction, from side to side without assistance; and in this way, one by one, our train of twenty wagons and three ambulances passed over in safety. Three miles farther we crossed the Purgatoire, to join the

surveyors on the eastern bank, over a bridge built by the settlers who lived in this part of the valley.

It was a great pleasure to us to find farms and settlements here, for they were the first we had met with since leaving civilisation. The banks of the Purgatoire are well-timbered on both sides, not by single rows of cotton-woods, but by groves of many kinds of trees—box, elders, willows, &c., amongst which the wild vine, the hop, and other creepers grow luxuriantly, and give an abundance of refreshing shade. The inhabitants of this little settlement formed a wonderful mixture of races; and when curiosity to see my camera had brought the inhabitants from their adobe houses and log-huts, it would have been difficult to find a more motley group.

To this point the ancient wave of Spanish occupation had just reached, and a few families of indolent Mexican half-breeds still remain to represent the Peons of a few years back. Some of them had the woolly heads of the African; in others the high cheek-bone and broad mouth of the Indian were the most striking features; while in some few the large, dark, lustrous Spanish eye shone out unmistakably from the otherwise unattractive visage. Then there was Mr. Boggs, a tall, shrewd, energetic Western man, by whose perseverance the fine fields of maize and wheat seen on either side had been planted. He gave occupation to all who chose to work, and had already 1,000 acres of land under cultivation, besides some fine herds of cattle. Every one knew Boggs' Ranche, which name embraced generally the whole settlement. Two or three other Americans, doing business in a small way, either as traders or farmers, also lived in the colony. Here also we met one of the sons of Colonel Bent, a well-known veteran of the plains. A few days previously the father had visited General Wright at the fort; he was over sixty, with small

black piercing eyes, and face as deeply bronzed as that of an Indian.

The old warrior commenced life by fighting the red-skins, but afterwards married a couple of squaws, and spent nearly all his days afterwards trading amongst them in peace. The son we met at Boggs' Ranche is a half-breed, and as such is decidedly a good specimen, for in every respect the American in him predominates over the Indian. He is sufficiently educated for ordinary life, and owns a flourishing farm two miles farther down the river, which I regret not having been able to visit when invited by him to do so. He has a brother, however, whose proclivities led him quite in the other direction, and whose white blood made him even a more dangerous and relentless savage than his half-brethren. He is chief of the band of Cheyennes, to which his mother belonged, and has for years been the terror of the unprotected settlers.

To complete the group of "human curiosities" at Boggs' Ranche, a family of Ute Indians had built their little lodge of sticks and old sail-cloth in a grove behind the cattle-shed. These hideous creatures, half clothed with skins, their coarse black hair falling in matted clusters over their faces and shoulders, stared vacantly at us as we passed, and terrified our horses as much as if they had been wild beasts.

On crossing the river we found a large well-filled ranche on the opposite side, which had only just been built by two enterprising Yankees. Here we could buy everything—clothes and candles, bowie-knives and groceries, canned fruits and Mexican saddles, powder and shot, boots and shoes, caps and crinolines, Worcestershire sauce, whiskey, and drinks without end. This well-stocked storehouse, raised up in the wilds, to which everything has to be carried hundreds of miles by wagons through a hostile Indian country, speaks

more for the extraordinary energy and foresight of these Western traders than any panegyric I could write. The circumstances which caused these two enterprising traders to invest their all in such a venture was simply this:—they recognised the great fertility of the Purgatoire valley; they saw the success which accompanied the efforts of the few settlers who had come there, and they became convinced that such a district could not long remain an uninhabited wilderness. So, having built their ranche at the head of the valley,

The Purgatoire River.

where all must enter, they confidently expect soon to reap a rich and lasting harvest.

Eight miles up the stream there is another farm, or ranche as it is called, belonging to an American, named Sizer, who acted as our guide through this country. There may be two

or three others, of small size, but beyond these the whole valley (or rather succession of valleys), from the mouth of the Purgatoire to the Great Cañon, a distance of nearly sixty miles, is quite uninhabited. If it were generally known what a beautiful country this is it would not long remain thus unoccupied. The river is deep, I bathed in it frequently and always found it out of my depth, and when we recrossed it, on the third day after our departure, we had great difficulty in finding a ford. The current is very rapid, and a large body of water is always to be found in the channel, even during the driest season. The banks are usually from three to five feet above the stream, and are formed of dark, rich loam. The average fall is from eight to nine feet per mile. To farm successfully irrigation is necessary, and for this purpose no country can be better adapted. The bluffs on either side of the river enclose between them large areas of the richest ground, which might be called bottom-lands, only they are not subject to inundation.

Riding through a succession of these valleys, we were charmed with the graceful trees, the long wavy grass, the groves and vistas which everywhere abound, and produce an effect which strongly recalls the lovely parks of the south of England. A plant (*Solanum eleagnifolium*) resembling the potato, and bearing intensely blue flowers, grows luxuriantly here, and encourages the belief that the soil, unlike that of the greater part of New Mexico, is well adapted to potato culture.* The box-elder was in bloom, as well as many other

* Amongst other plants of the same order (*Solanaceæ*) I recognised two familiar species in the *Solanum nigrum* and the *Dulcamára*; and three other very beautiful specimens peculiar to the Far West—*S. nostratum*, Pursh., a small plant covered all over with long sharp thorns, and bearing a beautiful yellow flower, *Physalis lobata*, Torr., and *P. longifolia*, Nutt., both very singular varieties of the ground cherry. Two more plants I must mention as peculiarly beautiful productions of the Purgatoire valley; the first is an

shrubs. The sunflowers grew so high as to tower above us as we rode through them. Cactus plants, which, as we went westward, had gradually become larger and more numerous, here attained the height in some places of five feet, and bore rich crimson flowers. Doves cooed and fluttered about amongst the trees and long grass; magpies visited us for the first time, and followed us hooting, as is the wont of these inquisitive birds; graceful deer hid themselves in the thickets, and wild turkeys took refuge in the highest trees; while two cinnamon bears were found amongst the currant and gooseberry bushes which grew in great abundance by the water's edge. Wherever the earth is especially bountiful, there we are sure to find abundance of animal life.

By taking advantage of the rapid descent of the river, every one of these valleys could be most easily irrigated. A main ditch, or "acequia madre," running close to the bluffs, could be dug around each of them, and smaller ramifications could be brought across the space thus enclosed. Our guide boasted of having raised by irrigation on his farm eighty bushels of Sonora wheat to the acre, and forty bushels of oats; and showed us a number of wheat ears as specimens, which, both in size and weight, were astonishing samples. The fields of maize and other produce which we saw looked most beautiful; the wild hops were twice as large as any I have ever seen in Kent, and unpleasantly reminded me of the absence of bitter beer. Besides the fertility of the soil, two other facts are of importance to the settler: the high price of all agricultural produce, and the inexhaustible nature of the soil when cultivated by irrigation.

exquisite little crimson convolvulus (or rather *Ipomea*), quite new to both Professors Gray and Durand, and probably unique (No. 54 in my collection), the other is an equally delicate species of *Commelyna* (No. 35).

Every time the muddy water of the river is turned upon the land, it deposits its sediment, highly charged with the fertilising produce of the decomposed mountain rock; and, like the Nile, always keeps the ground rich and productive, without any other kind of manure being necessary.

Leaving the valley on the 24th of July, for the more
July 24. elevated plateau, we found the country everywhere covered with the rich Grama grass of New Mexico, yielding the best possible pasturage; and day by day, as our course led us usually some eight or ten miles from the river, we had no difficulty in obtaining good camping places, at the head of some ravine or washed-out gully, which cut its way through the edge of the plateau into the valley. In such a situation we usually found a good spring or a water-hole, hollowed out in a rock, containing a plentiful supply of good water.

Along the sides of these ravines, and dotted about along the hillocks and cliffs, were abundance of cedar trees, but these were seldom large enough to be useful for any other purpose than fire-wood. Over all this pasture region, it was rare indeed to see domestic animals of any kind, though herds of antelope were abundant. Once or twice a miserable flock of Mexican sheep, or rather sheep and goats mixed, were found in some hollow; but as a general rule, the whole of this district is at present unoccupied.

On the 25th, we visited a curious monument on the face of a sandstone rock, facing the Purgatoire, about forty miles from its mouth. This was a representation of a bear, rudely painted, life size, on the flat porous surface. The proportions were good, and the attitude very natural. The animal was represented sniffing the air, and the colouring matter used had sunk so far into the rock, that although it had to some

extent peeled off in layers, the image was not by any means defaced. Nothing is known of its history, either by the Mexicans or the wild Indians, who seem to hold it in veneration, probably as a medicine charm; for many rude representations of lizards, beavers, and other animals of grotesque form, were scratched around it in Indian fashion. Some few beads were also found about the rocks, and some grooves, made by sharpening the iron heads of the arrows, were cut into the stone in several places. The painting was most probably made by a party of French or Spanish explorers at some distant period, either as a sign to show the direction they had taken, or to mark some treasure hidden away by them. No treasure, however, has yet been discovered there. The place is difficult of access, and can only be found by one well acquainted with its exact position.

On the 26th, General Wright, Dr. Le Conte, myself, and a few of the escort made a détour of twenty-six miles through some of the valleys which lie, like links in a chain, along the course of the Purgatoire, and are similar in their beauty to those which I have described above. These valleys averaged about seven miles long by from one to three broad, and were separated from each other by the close approximation of the bluffs to the river here and there for a short distance.

We left the river near the lower end of the Great Cañon, and passed on to the upland country or plateau by means of a side ravine six miles long. Some fine water-holes lay at the entrance of this ravine, to which next morning we moved our camp. As soon as tents were pitched, I retraced my steps down the ravine, with photographic "outfit" strapped on a mule, accompanied by Mr. J. Bell, whose kindness in assisting me on so many occasions I shall ever remember with gratitude. Our object was to penetrate, if possible, into the Great Cañon

and take some views of it. We were, however, prevented by the escape of our mule, who broke away while we were engaged in taking a view in one of the valleys, and ran back to camp as fast as he could.

Next day we brought back the defaulter, and pushed forward towards the cañons; but the huge rocks and fissures which blocked up the sides, and the trees and brushwood which choked the passage, made our advance so difficult that we were obliged to relinquish the idea of taking any views of the gorgeous scenery, the sight of which amply repaid us for our trouble.

The walls of the cañada, or little cañon, leading from our camp to the river consisted, for the first three miles, of grey sandstone cliffs, but below this point the grey walls began to give place to lofty masses of deep red sandstone. Gradually as we advanced, this formation took the place of every other kind of rock. Its texture was soft, and the hand of time had honeycombed it with little caverns and holes of every shape and size; lofty spires and fantastic minarets towered upward towards the sky; while at our feet huge masses of nature's masonry, piled up in endless confusion, barred our way. With great labour we overcame these obstacles, and a little farther on became entirely surrounded by the perpendicular walls of this bright, fiery red sandstone.

We had come to the entrance of the Red Rock Cañon; and never have I seen anything to equal the wonderful effect of this mass of colour. There cannot be a doubt that, coming unexpectedly upon this marvellous spectacle, *Purgatory* was the instant and unvarying idea impressed upon the imaginations of the French explorers from Louisiana who first visited this spot; for it seemed only just out of some mighty furnace, and looked as if, a little farther on, within the narrow

jaws through which the boiling waters came seething down, the whole chasm was even then red-hot, and ready to engulf those whom *Holy Church* had doomed to destruction. An Indian trail, overgrown and abandoned, led through the defile, and could easily be traced, except in those places where it was necessary to travel in the bed of the stream. We heard that it was possible, though very difficult, to pass completely through this cañon, but we met no one who had done so; and want of time obliged us most reluctantly to give up the attempt ourselves. Its length is about thirty-two miles.

Between the grey and red sandstone a stratum of snow-white gypsum crops out at several places near the commencement of the cañon; and this position seems to be very constant, not only here, but in Arizona, as mentioned by Dr. Newberry; for wherever the space between these two strata was exposed, a layer of gypsum was almost invariably found lying between them. Dr. Le Conte received information of a bed of alum, several feet thick, some eight miles up in the cañon, and obtained specimens of it in Trinidad.

Soon after leaving Fort Lyon we were joined by Mr. Boggs, who drove up in a very nice buggy, drawn by a pair of beautiful bays, in the sleekest possible condition. This gentleman most kindly remained with us several days, and gave us much information about the country.

On the 29th, while riding ahead of the train, we saw at a distance a herd of cattle grazing peacefully on a sloping hill. Mr. Boggs and myself immediately pushed on to make good our discovery by buying one of the oxen; but after making a circuit of ten miles, we could find neither hut nor herdsman nor any sign of living being. So we drove some thirty oxen back into a ravine, at which place the wagons

had been directed to stop, and by the time the train had come up, a fine young cow lay ready for the butcher's knife. We all supped well that night, for the beef was fat and well-flavoured, while our beans and bacon had long ceased to be a novelty.

Next morning I started, with a sergeant and two men, for Trinidad, the first and only Mexican town to be found north of the Raton Mountains. It is situated close under the mountains, in the upper valley of the Purgatoire, and at the foot of Raton Pass, through which the Santa Fé road runs. There is a post-office here; and it was for the purpose of inquiring for letters and posting those of the party that I made this trip.

July 29.

A more complete specimen of an Americo-Mexican town than Trinidad could not be found. It consists of a main street, lined on either side by adobe houses of one story, with flat roofs and few rooms. Many of these were "stores" belonging to American traders, and well stocked with goods; two of them were billiard-saloons, and two were boarding-houses—all American innovations. There was no public-house proper, but strong drinks were sold at every one of these establishments, and, so far as I could make out, at every house in the town. "Liquoring up" seems to be the sole amusement of the inhabitants. It commences before breakfast, goes on all day, and begins again with renewed vigour at sunset.

All the upper valley—viz., that above the cañon—is settled by Mexicans; and there is scarcely a mile along the stream in which you do not find a ranche or two. Each farmer irrigates as much land as he is able to look after, and finds a ready market for the produce here.

There are no police, no magistrates, no military; so the

people take the law into their own hands, and deal out summary justice to all offenders. Horse-stealing and cattle-lifting are punished, as a matter of course, by death. The proper amount of punishment necessary for murder depends upon circumstances and the social status of the murderer.

I was passing away an hour or two of the evening in one of the billiard-saloons, watching the strange and grotesque appearance of the motley crowd of "loafers" and others, all armed with bowie-knives and revolvers, when I noticed a tall, well-built fellow, his face covered with long, wiry, dark-red hair, and his legs almost hidden in those enormous top-boots so much in vogue amongst miners. He was taking a drink with a friend at the bar. After this he went out; and so many followed him that the room was left comparatively empty. This most ordinary occurrence suggested nothing to my mind; but at breakfast next morning, the good landlady, with the delightful loquacity peculiar to her calling, disclosed to me its real meaning. The tall, red-haired miner of the evening before had robbed and murdered his companion a year previously near this place, and had made good his escape to Denver. Trusting to the change he had made in his appearance, he had ventured back to his old haunts at Trinidad. A few days after his arrival, first one and then another recognised him, and laid their plans for his capture, which were quietly and skilfully carried out before my eyes in the billiard-saloon. He was invited to drink at the bar; then, on being told that some one was waiting for him in the street, he went out directly, and was immediately surrounded. Seeing that resistance was useless, he quietly remarked that they had been one too many for him this time; and, without more ado, walked with them to the inn. Before twelve o'clock that night he had been tried, condemned, and executed.

While I was enjoying the luxury of a comfortable night's rest in a bed (a rare luxury), the corpse of this miserable man swung to and fro from a tree in the coralle within a few yards of my window. Our landlady was much grieved that all her eloquence had failed in making a penitent of the murderer. She had lectured him for fully an hour, and yet he remained unmoved. It was evident, therefore, that he fully deserved the fate which Lynch law had decreed for him.

Barbarous and uncivilised as this rough kind of justice is, especially amongst Europeans in the nineteenth century, I doubt whether it is not better than the systematic evasion of justice which is so commonly practised throughout the Western country where the formalities of law are gone through, either by local magistrates or the officers of military establishments, but where criminals of all kinds usually escape with little or no punishment. I speak from actual knowledge when I say that my horse is safer in a coralle at Trinidad, than in an officer's stable in Fort Union.

It was impossible for a passing visitor to tell how the Americans and Mexicans managed to get on together. There appeared to be every prospect of peace at the time I was there, but before the autumn had far advanced, a very different state of things seems to have arisen. As far as I could make out from the reports which reached me at San Francisco, one of the Americans had shot a very popular man amongst the Mexicans in a midnight brawl, and as the friends of the former refused to give him up, the Mexicans united in a body of five hundred strong, and attacked the place. The Americans were so greatly in the minority, that they were obliged to take refuge in their houses, and sustain a siege for nearly a fortnight, during which time some seven Mexicans were shot by the defenders. As military assistance did not

arrive, and provisions at last began to fail, the Anglo-Saxons had to surrender, but under what conditions I could not discover. When the soldiers at last arrived, the war was over, and the little population had returned in peace to their former occupations.

After stopping the night at Trinidad, I returned to the surveying party, which I found camped about twenty-five miles distant, on the banks of the Purgatoire, within a few yards of the mouth of the Great Cañon. We remained here three days, in full view of the mountains, during which time General Wright examined some of the passes, and decided upon our future course.

CHAPTER VIII.

THE RATON MOUNTAINS.

Passes in the Raton Mountains.—Head of the Purgatoire Cañon.—Photographic Difficulties there.—Colonel Burgeman and the Guide, Francisco, sent by the Merchants of Santa Fé to welcome and assist us.—We surprise an Indian Camp.—The Flight.—The Parley.—The Chase.—Trinchera Pass, Origin of its Name, Trap Dyke.—Fertility of Raton Mountains, Trees, Flowers, and Game.—Arrival of General Palmer.—Antelope very Abundant, how to kill them.—Discover Cimarron Pass.—A Night with the Ranche-men in the Mountains.—Head Valleys of the Cimarron River.—Extinct Volcanoes.

THERE are four passes through the Raton Mountains; two are practicable for wagons, and two are not.

The most western is Raton Pass, through which the Santa Fé road runs. This is the travelled highway over the mountains. It passes around Fisher's Peak, the most lofty pile of basaltic rocks in the range, is 7,169 feet above the sea, and twenty-two miles in length.

The next pass is that known as the Manco del Burro (the Pass of the Lame Donkey). Coal was discovered here by Mr. Eicholtz, but Captain W. F. Colton, on making a second examination, could only find three narrow veins, separated by thick beds of sandstone. The pass is rugged, and the worst of the four.

Next comes Trinchera Pass, situated about the centre of the mountains, and thirty-five miles east of Trinidad. It is by far the best natural highway across the range; and although it had not been used for wagons until our train passed through it, there is no doubt that a very small outlay would make it, not only a shorter, but a better route

to Fort Union and the south-west, than that *viâ* Trinidad and Raton Pass. Its elevation is 7,079 feet. For seven miles it leads straight across the mountains with an average grade of from 90 to 116 feet per mile; it then descends more gradually for three miles, ending in a valley running at right angles to it.*

Lastly, a fourth pass was discovered by General Wright, about fourteen miles farther east, lower than any of the others, most suitable for a railroad, but too rough either for a wagon road or even a mule path. This has been named Cimarron Pass; its elevation is 6,166 feet.

While camped at the mouth of the Purgatoire Cañon, I examined that end of it. None of the grandeur of the Red Rock Cañon was to be found here; the walls were perpendicular only towards the top, and were composed of grey sandstone, somewhat metamorphosed, probably from their proximity to the Raton Mountains, which are partly volcanic. They did not exceed 200 feet in height, yet it was difficult travelling along the banks, for it took my friend Walter Hinchman and myself four hours to lead a mule packed with my photographic "outfit" two miles, in which short distance we nearly lost our valuable quadruped in a quicksand, and had to load and reload at least half-a-dozen times.

In the evening of the 1st of August we received at camp a great acquisition to our party, in the arrival of Colonel Burgeman, who had been chosen by the gentlemen of Santa Fé to welcome General Wright and his engineer corps at the threshold of New Mexico. He brought with him the most famous guide of that part of the country, Francisco by name,

* The traveller to Fort Union should then follow the valley for three miles in an easterly direction (turning to the left), when he will find an easy passage out of it at the foot and to the right of La Tenaja into a broad plain called Hay March.

a tall wiry Mexican, whose seventy summers had certainly not lessened his powers of observation or his "bump" of locality. Not a trail or a spring was unknown to him; and no matter how confusing the country was, he was always right in his directions. The thoughtful courtesy thus extended to us by the people of Santa Fé, and the kindness and affability of their representative, was fully appreciated by all. For myself I can only add, that I wish one met more frequently such a thorough gentleman, in every respect, as Colonel Burgeman.

On August the 4th we broke camp at the head of the cañon, and marched to the foot of Trinchera Pass, a distance of about thirteen miles. During the march, General Wright, Dr. Le Conte, Colonel Burgeman, with his guide, Francisco, and myself, accompanied by Captain Cane, who commanded our escort, and half-a-dozen cavalry, went ahead to reconnoitre the country. We had not advanced more than three miles in front of the train before we saw in the distance two or three parties of men moving towards us from the east. At first we took them for Mexicans, but on closer examination concluded that they must be a party of Ute Indians, returning from a foraging expedition to their homes in the mountains. A little farther on we ascended a hill, covered with cedar and piñon trees, from which we expected to get an extended view of the country. We here ran straight into an Indian rancheria. The red-skins had just made off, and were galloping away as fast as their ponies could carry them, leaving the ground strewn with all the litter of a camp. The warriors stopped about a mile from us, and being joined by those coming up, watched us as closely as we did them; for we were somewhat puzzled to tell why, if they were Utes, with whom the settlers are at peace, they should make so precipitate and suspicious a flight. From the high ground

August 4.

occupied by us, we sent two of our number—Francisco, the Mexican guide, and a sergeant—out towards them, to invite a parley. They in like manner separated two men from their ranks; but, instead of waiting where they were, the whole party stealthily followed close in the rear of their representatives. Much shaking of hands accompanied this meeting of the respective delegates, during which time the other warriors were able to come up and join them. As Francisco and the sergeant did not immediately return to tell us of what tribe the Indians belonged, but advanced towards us with the rest, Colonel Burgeman went out to meet them, and soon returned with a very troubled face, saying that he was certain all was not right. Their story was that they were friends of the white men, but had come to fight the Utes, who had been hunting buffalo in their country; they begged to be allowed to take away their things, but did not seem to be inclined to say who they were. As they were formidable in numbers, and well armed, we did not think it advisable to refuse their request.

Retiring a few yards, and presenting a bold front to them, we watched their proceedings. They were painted in the most approved style for warriors on the war-path, with feathers, gay-coloured trappings, silver ornaments glittering in the sun; and besides these barbaric adornments, one man wore a blue coat with brass buttons, the chief a cocked hat; some wore waistcoats; and the only squaw amongst the party, who rode astride on the right of the chief, appeared to be the happy possessor of a gaudy pair of pantaloons. Her breast was bare, and her dark hair, which hung down over her shoulders, half-concealed her crimson-painted cheeks.

Without doubt we were mutually afraid of each other. While gathering up their traps, only a part of the warriors

were dismounted at one time, and when their goods and chattels had been secured, they seemed in no great hurry to be off, but commenced to eye us suspiciously, whilst they passed backwards and forwards, and in and out amongst the trees, for no apparent object but that of gaining time.

In the meanwhile, however, a messenger had been sent back by Captain Cane for reinforcements, and just, I may say, at the critical moment, a fresh body of cavalry dashed up the hill. In an instant the red-skins were in their saddles, and galloping away like the wind. General Wright was opposed to the use of any violence on our part if it could be avoided, but had we known then what we learned a few days afterwards, these painted gentlemen would not have escaped so easily. Captain Cane and his men chased them for about four miles, and blazed away at them, to serve as a gentle hint to make themselves scarce. A few shots were fired in return, but no casualties probably occurred on either side. Curiously enough, this was the first day since leaving civilisation that I had travelled unarmed, and I took good care that it should be the last.

These Indians were Arapahoes, and had joined with the other Plain Indians in the general war. The object of their present expedition into a district of country not their own, was to try and persuade the Utes of the mountains to join the hostile confederation; and they had entrusted a broken spear and a quiver of blunted arrows to the care of a Mexican, who promised to carry them as an overture of peace to the Ute nation. They had plundered several of the outlying Mexican ranches, and scared away the scattered settlers, who left their corn nearly ripe, and everything else, in mortal fear of the red-skins. All the meat and flour which we found on the hill, and which were thrown away a second time in the

flight, had been obtained by plunder from the unfortunate farmers. Had we not most opportunely stopped these marauders just at the outskirts of the settlements, a great part of the upper valleys of the Purgatoire might in a few days have been swept bare of everything—flocks, herds, farm produce, and inhabitants.

The foot of Trinchera Pass made a beautiful camping-place. A clear, sparkling rivulet flowed down from the pass, which was bounded on both sides by lofty basaltic cliffs. Close to our tents, a beautiful specimen of trap dyke crested a range of foot hills, having a direction south, 60° west. It looked exactly like an old wall, broken down in places by time. The large bricks were piled one upon the other with wonderful regularity; and where the stream passed out upon the plain, a fine gap was left, forming the gate of the pass.

Our party remained here from the 4th until the 12th of August, so that there was abundance of time to examine the fresh country we had just entered.

The soft murmur of the brook was sweet music to our ears, and all the variety of mountain scenery looked more lovely than ever, from the contrast it presented to the monotonous plains over which, for the last two months, we had been travelling. There is nothing bare or rugged about the Raton Mountains; every part is covered with vegetation, except the perpendicular ledges of basaltic rock which fringe their flat summits. The richest pasture fills the valleys, and gradually gives place to piñon woods and thickets of locust and scrub-oak. Higher up in the ravines, tolerably large oaks are found; and, higher still, large clusters of noble pines group themselves around the summits. In my many rambles, I collected quantities of wild flowers, which, in beauty and richness of colour, could not be surpassed. Little mountain

marshes were often met with, and in these I found some great botanical prizes. When a railroad brings these mountains within reach of the botanist, he will there find that exquisite little lily, *Calochortus Venustus*, and amongst the Labiatæ, *Monarda fistulosa* (No. 66) and *M. aristata* (No. 65). Of several Penstemona, *Penstemon barbatus* (No. 81), with its gorgeous crimson flowers, will rival any other species in that gay family; numerous species of Gilia will be carried back to adorn our gardens, the most beautiful in my collection being *G. longiflora* (No. 58), a very graceful plant with delicate blue flowers, *G. pulchella* (No. 57), the queen of the family, with flowers of every tint, from pure white to rich pink, and *G. teniflora* (No. 56), a yellow variety. Twenty more species of this family have been collected in New Mexico. Conspicuous, amongst other plants, are *Ipomœa fandurata* (No. 55), *Castilleja integra* (No. 72), *Polygala alba* (No. 86), and *Lysimachia ciliata* (No. 83). Both black and white-tailed deer are numerous; and, judging from the tracks, I should suspect abundance of bear, for in some places nearly every stone had recently been turned over by those animals in their hunt for beetles, of which they are very fond.

August 7.

On the evening of the 7th of August, General W. J. Palmer, treasurer and secretary of the company, accompanied by Captain C. F. Colton, his private secretary, arrived at our camp. He came to relieve General Wright on the Rio Grande, so that the latter could return and place the results of the survey up to that point, before the directors, who were impatiently awaiting the requisite information to obtain the necessary additional aid from Congress before continuing their railroad farther into the heart of the continent. I had met Palmer previously at St. Louis, but I little thought, when I shared my tent with him and

GILIA LONGIFLORA, BENTH.
(Half natural size.)
Capsule natural size.

CALOCHORTUS VENUSTUS, BENTH.
(Half natural size.)
Petal and Stamen natural size.

POLANISIA GRAVEOLENS, TORR.
(Half natural size.)
Flower natural size.

Colton on their arrival in camp, that we should all three become such friends, or travel so many thousand miles together. In introducing my readers to these, my two best friends, it is necessary to say that Palmer and myself are about the same age, that is, under thirty; though active service in the war, and the responsibility of being the moving spirit of a great company, have added a few years, in moral influence at least, to the former. Colton is quite young, and one of the best fellows living.

August 9.

On August the 9th, while the working parties were occupied in surveying Trinchera Pass, General Wright, General Palmer, Colonel Burgeman, &c., started to examine the eastern end of the range. As we traversed the plain lying south of the mountains, we found the antelope so numerous that they were scarcely ever out of sight. At every mile we started a fresh herd; but these timid, watchful creatures take fright so easily, that it is next to impossible, unless you stalk them with the greatest caution on foot, to get close enough for a good shot. It is common amongst the Mexicans and Indians of the country for one of the hunters to envelop himself in a deer-skin, with good-sized antlers, and then to approach the herd, often stopping to lie down, or pretend to graze; sometimes retiring, and again advancing; until curiosity brings the antelope all round the intruder, when he is able easily to bring down his victim.

Having skirted the mountains for about twelve miles, we came to a gap in the range, the situation of which was especially advantageous, for it lay exactly opposite a grass valley or depression in the plain, known as the Chaquaco Valley, stretching northward to the lower end of the Red Rock Cañon of the Purgatoire. We therefore entered the gap and, ascending for two or three miles, soon came into

some very rough broken country, with bluffs and cañons on all sides. With difficulty we descended into a wide ravine or valley, running nearly east and west, where we saw some cattle grazing; and then, continuing our eastern course along it, we came upon some ranches owned by two Americans, Emery and Murphy by name. As it was nearly six o'clock we determined to stop here for the night, and while feasting upon some excellent black-tailed deer, provided by our hospitable hosts, we had a pleasant chat about their fine domain.

This is one of the chief head valleys of the Cimarron, and is well watered by a perennial stream. Through it runs a trail which, though a very good one, is used only occasionally by wagons passing between Fort Union and the Arkansas.

Murphy had two hundred acres of land under cultivation, which he irrigated or not, according to circumstances. Although he did not consider irrigation necessary, he found that it paid well to employ it, as it prevented the risk of failure and increased the productiveness of the crop. Emery had turned his attention to stock raising, and spoke most highly of the whole district. His cattle were in fine condition, and they could not have been otherwise with an unlimited supply of such rich pasture to feed upon. It is unnecessary to house either sheep, oxen, or horses during the winter, for neither frost nor snow are ever severe in any of the valleys on the southern slope of the mountains, and but seldom affect the pastures in any of them.

Next day we completed the circle by returning on the other or southern side of the range, and recrossing it through the Trinchera Pass to camp.

On some of the heads of the Cimarron River, which we passed *en route*, there were two or three ranches owned by

Mexicans, who kept a few cattle and goats, and farmed on a small scale; but, excepting this, the land was uninhabited. Yet, on the whole, this section of country is well suited for agriculture and stock raising, and, as we shall see presently, for coal mining. There is pine timber enough for local use and railway purposes, but not for transportation. The position of this district is most important, for it lies between that part of Kansas which is unsuited for agriculture, and some of the richest mineral regions in New Mexico, the development of which must stimulate and ensure the success of agricultural efforts throughout the Raton mountains and the valley of the Purgatoire.

Several conical mountains, with extinct craters, are to be found at different parts of the Raton range, especially on the south side. Before leaving the neighbourhood I ascended with Lieutenant Lawson the most conspicuous of them (called "La Tenaja" by the Mexicans), but although the crater was about 500 feet deep, and very well defined, there was no appearance of anything like recent activity.

CHAPTER IX.

RED RIVER VALLEY.

Our Wagons cross the Raton Mountains in Safety.—The Surveyors in Difficulties.—Reach the Head-waters of the Canadian River.—Red River (Terminal Branch of the Canadian) Valley.—The night-blooming Prairie Lily.—A Fresh Line has to be surveyed from the Purgatoire to Red River.—Map-making under Difficulties, or a Sketch of our Camp Life.—A Visit to Maxwell's Hacienda.—The Indians we found there and their Mode of Life.—Energy and Success of Mr. Maxwell as a Pioneer and Settler.

Distance:—From Raton Mountains to Red River, 64 miles.

On Monday, August 12th, General Wright, General Palmer, and party, with four wagons, started for Trinidad and the Raton Pass, while the rest of the engineers, having completed the survey of Trinchera Pass, struck tents and passed on through it, with the diminished wagon-train, to the south side of the mountains. Having got our wagons through the pass without accidents of any kind, we camped in the valley beyond, which meets it at right angles. Next day we turned down this valley to the left and found a very easy exit from it, at the western foot of the extinct volcano, "La Tenaja." This led us into a broad plain, extending for thirty miles or so in a south-south-western direction towards Fort Union—the largest military post in New Mexico. In the centre of this plain is a marsh of considerable size, known as "Hay Marsh." We had had rain nearly every day for a week past, and the ground was very soft and heavy for the mules; so, as we did not care to stop by the marsh, we pushed on to the entrance of a valley

August 13.

trending westward, and camped on a stream, after having travelled twenty-three miles. This was the first tributary of the Canadian River, or rather Red River (as it is called near its source), we had met on our route. The surveyors, however, who expected to obtain a good and short line through a subordinate range out of the valley which we had left in the morning, found the country much more difficult than they had expected, and were not fortunate enough to find a practicable passage into Hay Marsh, west of the foot of Trinchera Pass. They did not reach camp until very late, leaving the end of their line ten miles in the rear.

August 14. The 14th was spent in running this unsatisfactory line from its termination to camp.

On the 15th Colonel Burgeman and myself pushed on down the little tributary of Red River until we came in view of the main valley, in which we had the good fortune to recognise the four wagons and one ambulance of General Wright and those who had gone round by Trinidad.

Flat-topped hills* stretched down from the Raton Mountains along the eastern side of the broad Red River Valley, while at the other side rose the Rocky Mountains themselves. Having sent a cavalry man forward to acquaint General Wright of our whereabouts, we returned to camp to report that Red River was ahead, and that General Wright and his party had been recognised. So we moved camp a few miles farther down the stream, and next day made the connection, camping altogether on Red River, four miles below the spot where the main road to Santa Fé crosses it. The bluffs at the back of this camp, which here encroach upon the river, were covered with a plant until then unknown to me. This was a very large night-blooming Mentzelia (*M. ornata*, Torr.), called

* The most prominent being called the Eagle's Nest.

by the ranche-men the Prairie Lily. The flowers are larger than the finest water lilies, of exquisite whiteness, and remain closely shut all day, and even at sunset do not open. But at 10 o'clock, when I visited them in the bright moonlight, every petal was expanded to its full length, the barren rocks were changed into a perfect fairy-land, and the air was richly scented with the fragrance of the flowers. A full-grown plant stands from three to four feet in height. The petals measure three inches, stamens two inches, leaf four inches in length. These measurements, with the accompanying engraving, will, I think, give a fair idea of the flower and plant. The scent, although pleasant at first, brings on a violent head-ache if indulged in too freely, especially when sleeping under its influence. These plants seem very capricious, for we only found them in a few localities; but in these they grew in great abundance. Two other species of Mentzelia, *M. Wrightii*, Gray, and *M. nuda*, Nutt., were also night-blooming plants, and inhabited dry, rocky places; they were much more frequently met with than the above.

Next morning all were up and busy at sunrise, for General Wright had determined, without more delay, to send back Mr. Eicholtz and his division, to re-survey the line from the valley of the Purgatoire across the Raton Mountains to the head-waters of the Canadian. The soldiers of the escort were out of rations, and were starting for Maxwell's, a large hacienda guarded by a military post, and situated at the foot of the Rocky Mountains, about sixteen miles distant. Mr. Runk and his topographers might also be seen, with compass and rule, compiling the maps of the districts we had passed through; one would be reading out the results of the leveller, another computing the curves, a third sketching in the topography of the country adjacent to the

August 17.

line of survey. And this was a sight very common in camp; but, alas! sometimes, after hours of toil, a gust of wind would come, upset the ink or paint-box, rip up the nearly-finished map from off the impromptu table, and oblige the unfortunate map-makers to begin all their work afresh. In some places flies or grasshoppers would insist on helping the draughtsmen. Some would spot the canvas here, there, and everywhere; while others, not content with this, would first jump into the indian ink and then draw maps of their own wherever they chanced to alight. At other times clouds of dust would cover everything, nor could any amount of pegging down keep the tent free from it. If I mistake not, Mr. Trap, our topographer, can tell how a frightened mule got entangled in the ropes and pulled the tent down over one of his best maps when almost completed. So that it was a matter of great congratulation when a map had passed through all the many perils and dangers to which it was exposed during its progress towards maturity and was at last safely consigned to the tin case.

Leaving the busy camp and the prairie lilies, let us ride with the escort and pay a visit to Mr. Maxwell at his haciendas, for he may well be considered the great man of this part of the country. He is by birth a French Canadian, and has been five-and-twenty years in this land of his adoption. By a Mexican marriage he became the possessor of a Spanish grant, sixty miles by thirty in extent, covering most of the land contained in the southern angle which the Raton make with the Rocky Mountains, and extending south almost to Fort Union. Instead, however, of spending his life in idleness, as a Mexican land-owner would have done, he set to work in earnest to develop as much as he could his rich domain. His house is beautifully situated on a fine

stream, close to the point where it frees itself from the mountain gorges. It is built like a French villa, with an open court inside and a verandah, running the whole length of the building, covered by a projecting roof. Although made of adobe white-washed, it has the appearance of a modern brick building. Close to the house is the store or warehouse, well filled with everything necessary for a frontier man's life. Here the passing trader or traveller can buy what he pleases at a fair price. In the yard before the store many empty wagons were packed away, to be used when wanted. At the back of the house is a fine granary, several coralles, a farm-yard, sheep-pens, &c. Higher up the stream is a saw and flour mill, and, a few hundred yards down stream, the log huts of a little "one-company" military post, with stables, hay-stacks, and miniature parade ground, complete the establishment.

Far and near, on the hill-sides, many flocks and herds were visible, grazing, each under the charge of a Mexican or an Indian shepherd. In this magnificent climate the Mexican herdsman requires no hut or tent to cover him by day or night. With a little burro (a small breed of ass), on which he packs all his food and worldly possessions, he wanders about with his cattle, often for months at a time, all over the country.

Mr. Maxwell has been the first to introduce a fine breed of sheep into New Mexico from the States, and has conferred a great benefit on the country by so doing. Besides the raising of stock, he cultivates, I believe, about 2,000 acres of land by irrigation, from which he obtains very large crops of wheat, Indian corn, and other produce. He is also the Indian agent of the Mohuhaches, Utes, and Jacarilla Apache Indians; and has induced a large number of these wild sons of the moun-

tains to settle on a reservation within his grant. These tribes were, until lately, most troublesome, and kept up constant hostilities with the settlers, especially the Mexicans; but gradually Mr. Maxwell has completely gained their confidence, and treats them more as children than dependants. At my first visit to his house, I found him sitting on the steps of his door in his shirt-sleeves, surrounded by a motley group of squaws, papooses, and warriors, painted up and decorated in their usual style. They all seemed on the most familiar terms with him—talking and laughing, while the children played around. These people were paying him a visit: they had just ridden in from the mountains, and had left their ponies tied under the trees.

In the coralle at the back of the house, I afterwards discovered the old hags of this party hard at work cutting up two sheep, which had been given to them as a present; and I can assure my readers that no manager of Drury Lane ever produced three more hideous or unearthly witches than were these half-naked, withered old creatures, their faces striped with red and white paint, their matted grey hair hanging from their huge heads over their sunken shoulders, their pendent shrivelled breasts, and their scraggy arms; while their eyes brightened and their huge mouths grinned with excitement as they plunged their claws amongst the entrails of the sheep, and scrambled for the tit-bits.

When the buffalo on the plains have got their winter coats, these Indians of the mountains are wont to unite their strength and make a raid into the lands of their more powerful neighbours, the Kiowas and the Arapahoes, in order to obtain flesh for the winter, and skins; and many a fierce struggle they have with these tribes. Often they are driven back with thinned ranks and empty hands, and with no

means of support during the winter except the rations supplied to them by their agent; sometimes they return with fine robes and dried meat, as well as with trophies won from their neighbours. A few of these people can be taught to attend to cattle; but it is a hopeless task to try to teach them agricultural pursuits. The hatred of labour is in their blood, and it cannot be eradicated: their extinction therefore is only a matter of time.

The Utes tan hides better than any other tribe, so that buffalo-robes are the most valuable articles of trade amongst them. There was a good stock of robes at the store, from amongst which I selected one, which became my blanket throughout all my subsequent wanderings. There is nothing so necessary for a traveller in the Far West as a good buffalo-robe.

Besides the various interests of which Mr. Maxwell has, up to the present time, been the life and centre, another is now beginning to attract his attention—that of mining.

I watched him on the morning of my departure, while he panned out a little gold from the stream that dashed past his house. Some sixteen miles up that stream a few miners were already at work, earning fifty dollars a day by washing the yellow grains out from the sand. This was startling news for the proprietor of all the country around. He did not, however, ask them "what they meant by trespassing on his property;" but he welcomed them as friends—sent them timber from his saw-mill and sheep from his flocks.

At the very time that these rough prospectors from Colorado were disclosing to him the gold that lay hidden in the bed of the river which turned his mill, the geologist and the treasurer of our Railway Company came to examine the coal-fields over which his cattle were grazing.

As the vast deposits of tertiary coal which lie on the eastern slopes of the Rocky Mountains are now attracting much of the attention of those who have made the development of the Far West their especial study, I will give a brief outline of this important subject in a fresh chapter.

CHAPTER X.

THE COAL-FIELDS SITUATED ALONG THE EASTERN BASE OF THE ROCKY MOUNTAINS.

These Deposits are all of Tertiary Coal, or Lignite.—They cover an enormous Area.—Coal-fields near Denver.—Coal-fields beneath "Pineries," fifty miles farther South.—Those near Cañon City and about the Heads of the Huerfano River.—Croppings North of Raton Pass.—Large Deposits in Vermejo Cañon, and other gorges leading into the Valley of the Canadian River.—Deposits of Copper, Iron, Silver, and Lead Ores.—Valuable Gold-washings in the Taos District.—Rapid Growth of the Mining Region an earnest of future prosperity to New Mexico.

THE tertiary coal-fields of the Rocky Mountain system cover an area so great that it is quite impossible, from the partial examinations which have been made here and there along the slopes of the mountains, either to map out their limits or to come to any fair conclusion as to what are actually the richest localities. Not taking into consideration the country north of Denver, there are many fine coal veins to be found in the mountains west of that city.

Our geologist, Dr. Le Conte, visited two of the most important of those at present opened.

I. Murphy's, on Ralston Creek, twelve miles from Denver. This vein is 16 feet thick, and free from slate. The coal is sold at the pit's mouth for four dollars per ton (12*s.*), and is extensively used for fuel at Denver. It burns freely, with a luminous flame, and gave, on analysis—

Fixed carbon	55·31
Volatile matter	29·07
Water	11·7
Ash	3·92

II. Marshall's bed, on South Boulder Creek, twenty-three miles from Denver, is nearly horizontal. It exhibits 11 feet of solid coal, and is opened to a depth of 200 feet. On the authority of Mr. Marshall, the doctor states that the vein worked is the lowest of eleven, the thinnest being 5½ feet, while the nine others are each about the same thickness as the lowest—viz., 11 feet. These beds are separated by strata of from 25 to 60 feet of sandstone and clays.

ANALYSIS.

Fixed carbon	59·2
Volatile matter	26·0
Water	12·0
Ash	2·8

These two specimens will suffice as examples from the vast coal deposits at the back of Denver, where enough mines are already "located" to supply the whole of Kansas for ages to come.

About fifty miles south of Denver, in the spur from the mountains, known, from its timbered sides, as "the Pineries," large deposits of coal are known to exist; but at the present time I cannot give any exact information about them. South-east of "the Pineries" there is coal on the Big Sandy. "A coal-pit is worked near Cañon City, in the hills south of the Arkansas, from which the blacksmith's forge at Fort Lyon has been supplied."

On the Cimarron Route Dr. Steck states that with Gen. Carleton, he saw on Rabbit Ear Creek, four miles below the wagon crossing, a large vein of coal, apparently 14 feet thick. Should this deposit, of which I have heard from other sources, prove satisfactory, it will go far to offset a serious drawback in the almost entire absence of timber along this route.

On the Huerfano Route, Dr. Parry reports that he met with no workable coal.

On the route by "Puntia Pass," coal quite equal, if not superior to that of the Vermejo, hereafter to be described, was seen by Col. Greenwood at Cañon City. It occurs in veins, from 4 to 10 feet thick, and the deposit extends at least twenty miles down the Arkansas Valley, below Cañon City. This brings it to within ninety miles of Fort Lyon, or 204 miles from Sheridan, being the nearest certain supply of good coal to the present end of track that we know of. The quality is admirable, and the quantity apparently inexhaustible. Major Calhoun, of our party, estimated the size of the deposit between Hard Scrabble and Cañon City to be one hundred square miles. In the Wet Mountain Park the deposits are represented as equally good.

Between the Arkansas and the Raton Mountains coal has been found amongst the heads of the Huerfano River, which, no doubt, is the northern continuation of the deposit better known south of those mountains. Some of the extensive deposits exposed in the cañons, through which many of the heads of the Canadian River leave the mountains, were carefully examined by our geologist after he had visited those in the Raton Pass. I extract the following facts from his report. In Mr. Long's farm, on the Purgatoire, a vein, $3\frac{1}{3}$ feet thick, of which $2\frac{1}{3}$ are of good quality, was examined. In Raton Pass, one and a half miles beyond Trinidad, on the east of the road, several thin beds are exposed, varying from some inches to $3\frac{1}{2}$ feet thick. Four and a half miles farther on, other similar croppings appeared, as also at the toll-gate and four miles south of it. Mr. Wooten, who lives at the toll-gate, mentioned several beds known to him, and conducted our geologist over the hills to visit a vein 8 feet

thick, but did not succeed in taking him to the place. This deposit is stated to be in one of the most northern of the cañons which debouch into Red River.

The largest deposit yet discovered in these cañons is in Vermejo Cañon, between twenty-five and thirty miles south of Raton Pass. The high road runs within eight miles of the mines, from which the government workshops at Fort Union and the haciendas, as far as that point, are supplied.

On August 19th, Dr. Le Conte, accompanied by General Palmer and Captain Colton, visited them, and gives the following description:—

"After riding five miles up the valley of the Vermejo, by a regular and gradual ascent, we entered a cañon on the north side of the stream. We followed this cañon two and a half miles, to a coal bank, which is on the east side, about 25 or 30 feet above the bottom of the cliff. It shows 10 feet of good coal, in two beds of 5 feet each, separated by 10 inches of slate. Following the cañon above and below the bed, I obtained the following section, in which the thickness of the strata is estimated by the eye, except where contiguous to the coal-beds:—

	Ft.	In.
Sandstone from top of hill about	800	0
Clay	5	0
Sandstone with ferruginous beds	20	0
Coal (partly poor) and shales	10	0
Sandstone	5	0
Calcareous clay (grey)	4	0
Ferruginous clay	2	0
Sandstone	20	0
Coal (partly poor) and shales	15	0
Sandstone, laminated	20	0
Sandstone not laminated, massive	8	0
Shale	3	0
Ferruginous clay, indurated	1	0
Shale, slate, and clay, more carbonaceous below	25	0
Coal (good)	5	0
Slate	0	10

	Ft.	In.
Coal (good)	5	0
Shales	4	0
Ferruginous sandstone	3	0
Massive sandstone	20	0
Sandstone, more or less clayey, occasionally with well-marked vertical cleavage	80	0
Slates	20	0
Sandstone to bottom of rock exposure.		

The same bed, less perfectly exposed, is seen on the west side of the cañon, about half a mile above; near it are beds of a heavy dark grey stone, containing, according to an analysis by Messrs. Williams and Moss, 22 per cent. of iron.

"Carbonaceous shales are exposed in the main valley near the cañon. Returning from the coal bank to the main valley, we ascended it about three miles. It became gradually narrower, and at length was merely a cañon, trending north-west. We saw in it several exposures of coal, which had been imperfectly opened; but, as far as I could judge from the appearance of the contiguous beds of sandstone, they were parts of the same bank which I have described above. Iron ore, and large quantities of silicified wood of exogenous growth, occur at this place. Similar beds are said to be exposed in other cañons of this valley; and I afterwards learned from Mr. Maxwell that he had seen them also many miles above, in the main valley. Time was pressing, and we reluctantly postponed further examinations till another occasion.

"August 20th, Captain Colton visited the coal-bank in Blackmore Cañon, one of the north-eastern branches of the Vermejo. He procured specimens of the coal—which is of excellent quality—and kindly furnished me with the following section of the strata near the bed:—

	Ft.	In.
Sandstone	7	0
Slate	1	0
Sandstone and clay	2	0

	Ft.	In.
Sandstone, laminated	9	0
Slate	2	0
Coal	1	0
Slate	1	0
Sandstone, laminated	5	0
Slaty clay	8	0
Sandstone	2	0
Slate	10	0
Ferruginous sandstone	2	6
Slaty clay	5	0
Ferruginous sandstone	2	0
Slate	12	0
Sandstone with ferruginous strata	30	0
Slaty clay	1	6
Coal (10 feet only exposed)	12	0

Sandstone to bottom of cañon.

"While Captain Colton was visiting the Blackmore bank, which is only four miles from Vermejo Station, General Palmer and myself, under the guidance of Mr. O'Donnell, were exploring Bremer Cañon, the one immediately south of the Vermejo Valley. Five miles west of the stage road, we saw several exposures, mostly obscured by land-slips. The best of them showed 4 feet of good coal; another, of probably the same bed, showed 3 feet. These beds seem to be a continuation of those observed in the Vermejo cañons. Continuing our journey, we arrived at the hospitable residence of Mr. Maxwell about three o'clock in the afternoon."

Analysis of Vermejo Cañon Coal.

Fixed carbon	59·72
Volatile matter	27·73
Water	3·27
Ash	13·28

"The coal of Cañon City," says Dr. Le Conte, in another part of his report, "is so similar in appearance and situation to the beds I examined in the Vermejo Valley, that I have no doubt that it belongs to the same series, and that the strata of

the formation lie uninterruptedly along the base of the mountains, from the Arkansas to Maxwell's, and fill up the broad valley which would otherwise remain between the basalts of the Raton and the much older metamorphic rocks of the Rocky Mountains. The very thick formation of sandstone, containing the coal-beds described, ceases to skirt the foot hills of the mountain chain below Maxwell's, and reappears no more in our southern progress.

"The metamorphic ridges of the Rocky Mountains approach more nearly to the plain, and, so far as they have been explored, give evidence that they are as much loaded with mineral wealth here as in the regions north of the Arkansas. Eighteen miles west of Maxwell's a valuable copper mine has been discovered, and has been well opened for future development. Specimens given me contain silicate, green and blue carbonates, and sulphurets of copper, making a very rich ore. Good specimens of argentiferous galina and iron ore were also presented to me, but without note of the precise locality.

"Valuable placer washings of gold have recently been found in the same mountain ridge, which is the water-shed between the Little Cimarron and the Moro on the east, and the valley of Taos on the west. The excitement regarding the gold was becoming greater from week to week; and the last report that reached me, on my return by stage, was, that a party of five men from Colorado had taken out 1,200 dollars in one day."

This gold-field is now known as the Taos district, and contained within one year after its discovery on the estates of Mr. Maxwell in the spring of 1867, 3,000 miners. These miners have already formed a town, which in their confidence they have been pleased to name "Virginia City." It is worth

while to note that this is the first rush of American gold-seekers, in large numbers, to any district in New Mexico, and that it has come from the north-east. We shall see abundant signs farther south of similar and more extensive invasions; but these have come from the south-west. The miners have been Spaniards; and nothing now remains to tell of their existence but acres upon acres of earth undermined and honeycombed in every direction.

Let us hope that the success of this gold-field will mark the commencement of a long reign of prosperity to New Mexico, under Anglo-Saxon rule.

CHAPTER XI.

FORT UNION.

Position of the Line surveyed, from the Raton Mountains to Los Vegas.—The Rivers and Mountains passed on the way.—A Ride over Turkey Mountain.—Fort Union.—Kitty stolen.—Krönig's Farm.—Leave Fort Union.—Los Vegas.—Our Reception by the Citizens.—A Mexican *Baile* (Ball).—The Hot Springs of Vegas.—General Palmer, Captain Colton, and myself, proceed independently to Santa Fé.

Distances:—From Raton Mountains to Red River, 64 miles; from Red River to Los Vegas, 76 miles. Total, 140 miles.

From the Raton Mountains to the town of Los Vegas, the line surveyed by our party lies at a distance varying from twenty to thirty miles east of the foot of the Rocky Mountains, thus avoiding the spurs which jut out from them into the plain. It passes six miles to the east of Fort Union, and does not strike the foot of the main chain until reaching Los Vegas. The Santa Fé road, however, keeps quite near the mountains for nearly the whole distance from Raton Pass to Los Vegas. Both the road and our line of survey cross in this distance numerous streams, the heads of the Canadian —such as Red River, Rio Vermejo, Peñejo, or Ponaro, Little Cimarron, Ocate, Rio Moro, and at Vegas the Gallinas—the waters of which streams can be used with the greatest profit by settlers to irrigate the valleys through which they flow. It is far easier for the settler to dig irrigating ditches around the plot of land he has selected, than to clear a farm in a timbered country; and when once he has completed this, his first task, he can ever afterwards reap the benefits of a crop far more abundant and more certain than any that can

be raised in lands which are watered only by the rain-fall. In the most populous country in the world (China) nearly all agriculture is carried on by means of irrigation.

Fort Union is distant from Maxwell's by the road fifty-two miles; from the point where our line of survey crossed Red River, fifty-six miles. The country is for the most part a vast grass-covered plain, drained by the Red River. We are never, however, out of sight of mountains, some of which are isolated, and rise out of the plain with grotesque outlines, such as Wagon Mountain, shaped exactly like a huge wagon drawn by a pair of horses. Most of them partake of the mesa formation, as Mesa Apache; while others form ranges jutting out from the Rocky Mountains, as the Cimarron range, behind which are raised in stately grandeur the snow-capped summits of the main chain. The most beautiful, however, is Turkey Mountain, which sends up its three lofty and graceful peaks exactly in a direct line to Fort Union from the north-east.

Being on horseback, I took the mountain road to the fort on the 21st of August, and had one of the most romantic rides I can remember in all my wanderings. The partly volcanic nature of the rocks, together with the abundance of water, gave a fertility and freshness to the whole landscape, which contrasted most delightfully with the monotonous plains. Rich grassy parks, studded with noble trees, and watered by an abundance of rivulets, were hemmed in by glorious turrets of rock, and overshadowed by the pine-clad summits of the peaks, which, with the art of nature, broke the oppressive regularity of the sky-line.

August 21.

For twenty miles I wound my way through this beautiful country, yet all seemed given over entirely to nature, and there was not the trace of a human being except the path upon which I rode. No flocks or herds cropped the tender

grass. I looked in vain amongst the trees and up the valleys which opened into the pass, now on one side and then on the other, but there was no shepherd, no hut, no farm to be seen; the wild turkeys had all been either shot or driven away by the officers from Fort Union; and the same might be said of the deer; but with this exception—the absence of game—nature remained exactly as God had made it.

Fort Union is a bustling place; it is the largest military establishment to be found on the plains, and is the supply centre from which the forty or fifty lesser forts scattered all over the country within a radius of 500 miles or more, are supplied with men, horses, munitions of war, and often with everything needed for their support. It is not in the least fortified, as, of course, such a precaution would be useless; but it is a vast collection of workshops, storehouses, barracks, officers' quarters, and offices of all kinds belonging to the different departments. The dwellings, although built, as are all the other buildings, of sun-dried bricks, are most comfortable They are roofed with thin iron sheeting, covered with earth. The rooms of the officers are lofty and well-furnished. The hospital, containing about 120 beds, is a very fine building, to which two resident surgeons are attached. A large settler's store must not be forgotten, at which the daily sales average 3,000 dollars. Over 1,000 workmen are here kept constantly employed, building and repairing wagons, gathering in and distributing supplies, making harness, putting up buildings, and attending to the long trains of goods and supplies constantly arriving and departing. When we think for a moment of the hundreds of miles that everything has to be brought by a slow and expensive mode of conveyance—600 miles by wagon from the end of the railway, and nearly 1,500 by rail from St. Louis; when we consider the price of labour; when, in

fact, we view the economic aspect of affairs, even a traveller cannot help being amazed at the enormous expenditure of money necessary to maintain so large an establishment in such a locality. The millions of dollars which are yearly absorbed by such a place as Fort Union must be something marvellous; and the opportunities for peculation and growing fat by the misappliance of public moneys, by exorbitant charges if not by actual fraud, are probably greater here than in any other branch of the public service.

We pitched our camp a few hundred yards from the fort, and remained here a week for repairs. Before dawn, on the third morning after our arrival, my chestnut mare, Kitty, was "run off" from the centre of our encampment, where she had been picketed the evening before. Neither a large reward, nor a long day spent in scouring the country round, gave us the slightest clue to the direction taken by the thief.

The post commander had become resigned to the state of things, which enabled gangs of horse-thieves to carry on their depredations almost with impunity. Scarcely a week passed without some one or more horses being successfully stolen from the government coralles, and carried off into the wild country, where it was impossible to trace them. And, in fact, the very week after I had applied in vain for assistance at the Fort to track the thief who had robbed me of a mare —I was very much attached to my brave old Kitty—no less than five horses were actually taken out of the very stables of the officers, and successfully made away with.

About six miles south of Fort Union is situated what even in a civilized country might be called a model farm, which proves more conclusively than volumes of argument the worth of these regions for agriculture. Mr. Krönig, the owner of this farm, came to the conclusion from his own

observation, that the rain-fall along the base of the mountains was quite sufficient to supply artificial reservoirs from which tracts of land could be successfully irrigated. Notwithstanding the chance of such an experiment turning out a costly failure, he set to work, and has formed on the open plain two or three lakes, or reservoirs, from which he now irrigates 2,500 acres of land. I bathed in one of these lakes in passing, went over a fine house he is building near it, and saw with pleasure the groves and avenues of young trees which he had planted, all thriving beautifully. The yield last year was an average one of thirty-five bushels of maize, forty of wheat, and fifty of oats to the acre. He is now a rich man, and hopes soon to have another lake, and several hundred acres more land, in good working order. He also states that he feels convinced, that the rain-fall has increased since he commenced to irrigate and form the lakes. The success of this experiment is of infinite importance to the emigrant.

On August 29th, we bid good-bye to Fort Union, and proceeded to Los Vegas, distant twenty-six miles, the first Mexican town our line of survey had yet encountered. The situation of this thriving little town of 5,000 inhabitants, at the gate of the mountains, has made it, within the last few years, the seat of a very flourishing trade, and the abode of many energetic merchants, Americans as well as Mexicans; so that when the people of the place heard that "El cameno de fiero caril" (the road of the iron wagon) was actually going to pass through their town, they called a meeting and determined to give our party a hearty welcome. As we approached the town a party of about thirty, consisting of the chief men of the place, came out to meet us, mounted on horses caparisoned with the picturesque and gaudy trappings peculiar to the Mexicans.

August 29.

In the rear came a close carriage, within which a large silver urn occupied the place of honour, and tankards in abundance were placed around it. General Wright and all received a hearty welcome; we were invited to consider the hotel at our disposal free of charge as long as we remained, and we drank the health of each other, and success to the railway, in the refreshing beverages our hosts had brought for us.

Los Vegas is 6,452 feet above the level of the sea, and very nearly the same altitude as the divide between the waters of the Pecos which flow into the Rio Grande, and those of the Canadian which feed the Mississippi. This divide was crossed imperceptibly at a nominal grade between Fort Union and Los Vegas. From the latter place the line surveyed descends 727 feet in twenty-six miles, to the point where it crosses the Pecos River. Then commences an ascent of thirty miles to Filley's summit, at the head of Cañon Blanco, elevation 7,136 feet, the highest point attained east of the Rio Grande, and higher than any other crossed on the 32nd parallel along the entire distance to the Pacific. Between Filley's summit and Isletta on the Rio Grande, a distance of sixty miles, the line surveyed descends 2,084 feet.

The town of Los Vegas is built of adobe; it has a good-sized plaza in the centre, a most comfortable hotel, many well-filled storehouses and shops, and two dancing saloons, where Mexican *bailes*, or *fandangos*, as they are sometimes called, are carried on almost every night. The love of the people for dancing is almost insatiable, and they certainly indulge in it to their hearts' content. It is a common sight in most of the towns of New Mexico to see the fiddler and an attendant drummer-boy going the rounds at sunset, playing some favourite valse, to announce to all that there will be a dance that night. By nine o'clock (for they are very late for

country folk), all assemble in the ball-room, the fiddler tunes up, and, without introduction, each man leads out his partner to the dance. It is a curious fact, that the *baile* (pronounced bilie), which is quite a national institution in every Mexican village under the jurisdiction of the United States, is now far less common even in the larger towns across the frontier in Mexico Proper. I was much struck with the absence of gaiety in the same people, when crushed by the tyranny of the so-called Republic of Mexico, although in personal appearance both men and women had greatly the advantage of their more northern brethren.

Four miles and a half from Los Vegas, beautifully situated in a romantic valley up in the pine regions, are the hot sulphur springs of Vegas. These have been long celebrated for their curative qualities in diseases which are very common amongst the Mexican population all through New Mexico, and they are much frequented, although the accommodation is very limited and poor. Besides the water of the hot springs,—temperature 160° Fahr.,—which is most powerfully sulphurous, an abundance of the purest cold water flows down from the mountain, so that there is every prospect of this spot becoming a thriving watering-place as soon as the railway can convey the health-seekers and pleasure-hunters from the large towns of the States thither, to take a summer's pleasuring in the dry pure air of the Rocky Mountains. The springs are 7,500 feet above the sea-level—a much higher elevation than the famous hot springs at Leukerbad, in Switzerland. It would be impossible to exaggerate the magnificence of the climate in these upland regions of New Mexico. I may add that there are to be found, two or three miles above the spring, quantities of very fine specular iron ore. The pieces I examined were very strongly magnetic, and

remarkable for their purity.* Coal is also found near these springs, as well as in a bed near Agua Zarca, whence it has been carried six miles for use at Vegas.

Having now reached a district where hostile Indians were no longer to be feared, General Palmer, wishing to see as much of the country as possible, and being tired of the necessarily slow advance of the surveyors, determined to go on to Santa Fé independently. So the 2nd of September found us—Palmer, Colton and myself, with a very intelligent Mexican guide, Escobal, and one servant—wending our way through the beautifully wooded valleys and picturesque gorges which gradually slope down to the Rio Pecos. Behind followed our humble wagon carrying our luggage and provisions, and drawn by two weedy Mexican mules. A poor crippled Mexican as driver, who had at one time barely escaped from the Indians with his life, completed the "outfit" —the best we could get at Los Vegas, but one which broke down, as might have been expected, at the first difficulty we encountered. We carried no tents; Palmer, Colton and the guide were on horseback, I had to content myself with a mule, an animal by no means to be despised in the Far West provided he be a good one. Our spirits were high and our hearts light as we felt the freedom of travelling quite independently, and we watched with all the interest which the great object of our trip inspired, the general features of the beautiful country as they opened before us at every step.

Sept. 2.

A glance at the map will show that the course taken by us

* About one and a half miles west of the hot springs there are two nearly vertical beds of iron ore, the eastern one is a stratified mixture of quartz and magnetic oxide, 4 feet thick, and bearing north 70° east, with a dip of about 80° to the south and east. One hundred yards north of this bed is a granite bed with red felspar, 6 feet wide, carrying much specular iron, which is slightly titaniferous. A shaft was sunk 14 feet upon it by Mr. Erminger in pursuit of other metals.

passes around the southern extremity of the great mass of mountains which, running northward, form the eastern main chain of the Rocky Mountains. This southern extremity may be considered to be about sixty miles broad; it is drained on the south and south-east by the heads of the Pecos, and on the west and south-west by the Santa Fé and Galisteo branches of the Rio Grande.

As we wound about, following the course of the little valleys, and crossing the lowest parts of the ridges between them, we remained nearly always at an elevation of from 6,000 to 7,000 feet. Although we were nominally in the mountains, the reader must not imagine that our route lay amongst Alpine scenery, with great peaks towering up to the sky, and lofty ranges forbidding our advance. The ranges or sierras, on the contrary, are here short and irregular spurs from the main chain of mountains, and not mountains themselves: they have disturbed the overlying strata which, in the form of mesas,—flat-topped masses of sedimentary rocks,—cover most of the country, and add much grotesque beauty to the landscape. Sometimes their walls are of grey sandstone, at other times of deep red. They are often much variegated with masses of blue clay, and many are capped with an outflow of pillared basalt. In some places we look down over a district which seems to have sunk to a low level, containing its own mesas, of different colours, and bounded by the walls of higher ones on either side. The eastern slopes, of all the irregularities, whether they be sierras or mesas, are always more gradual than the western, and are generally more thickly covered with vegetation. Probably both facts arise from the same cause—a greater average rain-fall.

Frequently we passed through very fine bodies of pine

timber, and everywhere the piñon or nut-pine (*Pinus edulis*) grew in the greatest abundance. This species is said to bear fruit only once every seven years. If such be the case, then 1867 was the great harvest year, for the nuts were most abundant. The cone of a piñon tree much resembles that of an ordinary fir; but when ripe it opens, and discloses at the base of each scale a brown nut, about the size of a plum-stone, with a thin shell, and a plump delicious little kernel. The Mexicans believe the year of nut-harvest to be a very lucky one; they expect an unusual increase to their flocks and their families, and consider that those who are married, as well as those who are born during nutting-time, will have the best of good fortune in after life.

We found the country studded here and there with a number of Mexican villages, nineteen of which were within a distance of twenty miles from the proposed line of railway. The largest are Anton Chico and San Miguel, each numbering about 1,000 inhabitants; the smallest is Cuesta, containing about fifty families. The people raise sheep, horned cattle, mules, maize, beans, onions, red pepper, melons, &c., and in many places the crops are grown without irrigation. For many years they have been but little troubled by Indians; but on the 3rd of November, 1865, the wild tribe, known as the Mescalero Apaches, who had been induced to settle on a reservation at Fort Sumner, 100 miles south-east of Anton Chico, left in a body, and have continued from that time to roam about in search of booty, spreading terror and confusion amongst the unprotected Mexicans, robbing them of their flocks, and often murdering them if they resisted.

Early in the morning of the third day after our departure from Los Vegas we reached the Rio Pecos, at the Billiamdante crossing. Here our "outfit" stuck fast in the middle of

the stream. In vain we belaboured the unwilling mules, in vain we tried to make our riding horses draw; after hours spent in such useless efforts, we emptied the wagon and carried each piece of luggage across the rapid river, with the water above our waists; then we put ourselves in the harness and dragged the wagon through. When I say *we*, I include

The "Outfit" in Difficulties.

myself; but I did not become a beast of burden, science saving me from that degradation. While my companions, bereft of all garments save their shirts, were tugging manfully at the ropes, I was fulfilling a contract I had just made—that if I took a photograph of their manly forms, they would dispense if possible with my assistance. Here is the result.

Camping on the opposite bank for the night, we sent back

to the main party next morning for a pair of strong mules, and occupied the next two days as best we could, by examining the country up and down the river. The Pecos Valley is cultivated from Anton Chico (twelve miles below our crossing) to Fort Sumner, and in many open places, almost to its source, wherever there is good bottom-land easily irrigated; but below Fort Sumner the larger proportion of the stream is shut up in cañons as it passes through the sterile regions of the Llano Estacado. In the evening a Mexican brought us some fine large water-melons, onions, eggs, and fowls from his farm, two miles off; and told us that a body of fifty mounted Navajos (probably Mescalero Apaches) had made a raid on Cuesta, seven miles distant, three days ago, and succeeded in driving off some stock. We, therefore, kept a strict watch on our animals, and suffered no harm.

Next evening a well-known voice and a splash in the water announced the return of Colton with a fine fat mule, and a miserable, half-starved, shoeless, chestnut mare, both harnessed. "What," I cried out, "have you brought us that for?" "Well, you're a pretty fellow, not to know your own horse!" said my worthy friend, as he jumped from his saddle. And sure enough it was Kitty back again, but so altered from her fortnight's ill usage, that it was, indeed, hard to recognise her, reduced to a skeleton, and covered with dust and harness. The thief, a Mexican, had taken off her shoes for fear of being tracked, and had "run" her fifty miles from Fort Union to his farm in the wilds. But one of our surveying parties, while examining the country, happened to pass the very place where she was grazing. Seeing so much that was familiar to her in better days she came up, neighing, to her friends and was quickly recognised by Mr. Runk.

Close to the stream I found a very large species of Datura, which, I believe, is a native of Northern and New Mexico only—*Datura meteloides*. The flower looks at first sight like a huge convolvulus, whose corolla is eight inches in length from base to margin, and often five or six inches in diameter when fully expanded. (See Plate, p. 106.)

The seed-vessels look like balls covered with long spines; the plant attains a height of five feet, and has an unpleasant odour, but the flowers are agreeably scented.*

Next morning we started afresh, in better form, with four mules to our wagon, and did not again come to grief between the Pecos crossing and Santa Fé.

A long day's ride brought us, towards sunset, out of the wooded district upon the vast plain which forms the summit of the divide between the Pecos and Rio Grande.

Sunday, Sept. 7.

We passed rapidly on in the hopes of finding some lagunas, the only reliable water-holes within many miles on this lofty table-land; but were obliged at last to give up the search, to stop for the night, and to let loose our thirsty animals, to get on as best they might. They were very restless, however, and soon made off on an independent scout. We followed in considerable fear, lest they had made up their minds to return to the last drinking-place, some twenty miles in the rear; but to our infinite surprise, after a three miles' run, they stopped suddenly at a little rich green patch, which turned out to be a good water-hole some ten feet square. Horses and mules, if left to themselves, will often find water for the traveller when he has failed, but there is always the great risk of their quietly trotting back to the

* As some discussion has taken place as to the identity of this New Mexican plant and De Candolle's, I may add that the calyx in my specimen is 10-dentate, whereas Gray describes it as 5-dentate. See note, page 154, in "Mexican Boundary Survey," vol. ii. This plant is No. 5 in my collection.

last watering-place, should they be unsuccessful in their search.

Next morning we advanced due west, not towards Santa Fé, but towards the Placer Mountains, a district of very considerable interest, from the great mineral wealth it contained. As we crossed the table-land, a chain of mountains on the north came into view; these were the southern extremities of the Santa Fé Mountains, which lie to the east of that town, and are continuous with the main chain to the north of them. To the north-west, the country lying between these mountains and the Placers appeared to form one of those huge "faults," or depressions already mentioned, over which our eyes wandered with awe, if not with admiration. Nothing could surpass the disordered grandeur of that barren region. It looked perfectly unearthly—a waste of crags and cañons, deep-red cliffs, and precipices whose sides were striped with rocks of every hue, yet all bearing the same appearance of having been burned up in some fierce furnace. It seemed as if, having left purgatory behind, we had at last come to the gate of hell. The wag of our party remarked that here the devil must have frizzled all the Christians in the land, so that it was no wonder we so seldom came across any.

Sept. 8.

This country is drained by the Galisteo, and most of its wild arid confusion is due to erosion. Straight before us, as we travelled to the west, rose the three first well-timbered hills of the Placer Mountains; behind, stretched out the larger melon-shaped mass, the Zandia; and, far to the southward, the detached range of the Manzana (oak) Mountain terminated our field of vision. Now these detached mountains, and others south of them, which separate the valley of the Rio Grande from the barren table-lands at their back, are

most distinctly separated, both in appearance and geological formation, from the more northern chains of the Rocky Mountains. Between the former, roads, or rather trails, lead down to the Rio Grande. The road between the Placer Mountains and the Rocky Mountains follows the valley of the Galisteo; another between the Zandia and the Manzana, is called Tijeras Cañon; and a third, some fifty miles farther south, is known as the Abo Pass. The last two passes were surveyed, each by one of our parties, who reached them by different routes from Los Vegas. The Abo route was found to be a most beautiful line for a railroad, along the 32nd parallel, but that in Cañon Blanco and Tijeras did not prove so good, as the descent required nearly the maximum grade of 116 feet per mile for about twenty miles. The Galisteo route was not then examined.

On leaving Santa Fé for the south, Captain Colton and myself made a reconnaissance of this route, and thought it looked a very favourable one. It has since been surveyed by a return party with very satisfactory results, proving that the Rio Grande can be reached about the 35th parallel, without having recourse at any point to the maximum grade sanctioned by Congress. Curious to relate, there is coal in each of the passes here mentioned.

Having crossed the level grass-covered plain, a nine miles' ride through the piñon groves between the Placer Mountains brought us to a little mining village, the Real de San Francisco. We spent the whole week in examining the mines of this wonderful little district, about which, at the risk of tiring my readers, I must say a few words in a fresh chapter.

CHAPTER XII.

THE PLACER MOUNTAINS.

Spanish Grants.—Placer Gold Mining.—The New Placers.—The Mines deserted, and many of them stopped up.—Scarcity of Water a great Drawback.—A fine Pine Forest.—New Mexico Mining Company.—The Old Placers.—Iron and Limestone abundant.—Copper, Silver, and Lead Ores.—Anthracite Coal.—Great Cost of Transportation to the Mines.—When a Railway reaches this region, extensive Iron Works will probably be established here.

Distance:—Los Vegas to Santa Fé, 70 miles.

The greater part of the Placer Mountains is covered by two Spanish grants. The San Pedro, containing 40,000 acres, has for its centre the Real de San Francisco, and contains within it those extensive landslips which, as early as the year 1776, were worked as placer diggings by the Spanish miners and their slaves. This grant now belongs to three or four Americans, who, although possessed of so valuable a property, have no capital at their disposal to turn their wealth to account. The other grant is owned by a company, "The New Mexico Mining Company," and is ten miles square. Upon this property, as in the former case, one mountain especially, known as "Gold Mountain," has, during the lapse of time, been worn down by the action of the elements and by the attrition of rocks detached from the summit, so that an inclined plane, or "talus" of débris, has been formed at its base, in which large quantities of gold, the products of the disintegrated quartz veins which traverse the mountain itself, have collected. During the Spanish occupation the gold

washers, or "placer miners," worked here with great profit, and have given their name to this district also.

The former is called the New Placers, the latter the Old. The one is about thirty-five and the other twenty-seven miles distant from Santa Fé. It was only natural, when the rich surface pickings had been exhausted, and placer mining had become less remunerative from the necessity of being obliged to dig down deeper for the gold, that the miners should search in the rocks above for the veins from which the golden débris came. This is, in short, the origin of quartz mining.

The only two Americans living on the San Pedro grant or New Placers were, at the time of our visit, a Mr. Hutchinson and a Mr. Cooley, who received us most hospitably at the little village—the Real de San Francisco—and, during our sojourn there, gave us every facility for seeing as much as possible of the country and its riches. Within a radius of ten miles we visited several old mines in which the early Spaniards had expended enormous labour. Most of the mines had been stopped up by the Indians to prevent their subsequent discovery after the peons had succeeded in driving their masters from the country. The greater number were of auriferous quartz; one, reputed to be very rich, led through a very thick vein of auriferous copper ore; three mines in the Zandia Mountain, two of which had been much worked, were of argentiferous galena; another, which had been most skilfully stopped, was only lately discovered, and appeared to ramify very extensively through a horizontal vein of decomposed auriferous quartz. We also visited some new mines opened by our hosts. They were working them in a very small way, being obliged to cart the ore some distance, either to a rude horse *arastra* two miles

and a half off, or to a stamp-mill thrice that distance. Yet the ore was wonderfully rich, a specimen examined for our geologist yielding 738·86 dollars gold and 7·50 dollars silver to the ton, while a cartload which we saw ourselves passed through the mill yielded 60 dollars, the average of the whole yield being 45 dollars per ton. This was from the Candalaria Mine.

Then we inspected the placer diggings, whence the district takes its name. Here acres upon acres of earth have been turned over and washed in the rough Mexican fashion. We were told that in most places, where there had been a land slide, an ordinary Mexican miner could even now "pan out" from two to five dollars a day. Yet nowhere, except at the Americans' mines, did there appear to be the slightest activity. We expected to find a bustling throng of excited miners, but there was not a sound to raise the echoes of the mountains. Where the signs of former industry lay thick around, all was solitude. In the village lay a large steam-engine, and around it a dozen rude Mexican arastras, but the stones were broken and the machinery was crumbling into rust. When we asked why, we were told, first, that the Mexicans had no ambition to better themselves, and preferred idleness to wealth; and secondly, that as yet neither capital nor energy had entered the country, for the attention of the public had not yet been directed to it. There is, however, undoubtedly one great drawback—scarcity of water. Where it is most wanted it is either entirely absent, or the supply is very insufficient. There are, however, in many places some good perennial streams, which can be utilised whenever sufficient capital is brought to bear upon them. By judicious boring, also, a supply may some day be obtained sufficient for every necessity. But should

the local supply not keep pace with the requirements of the miners, any quantity could be conveyed in pipes from the Pecos, just as it is in a hundred places along the base of the mountains in California.

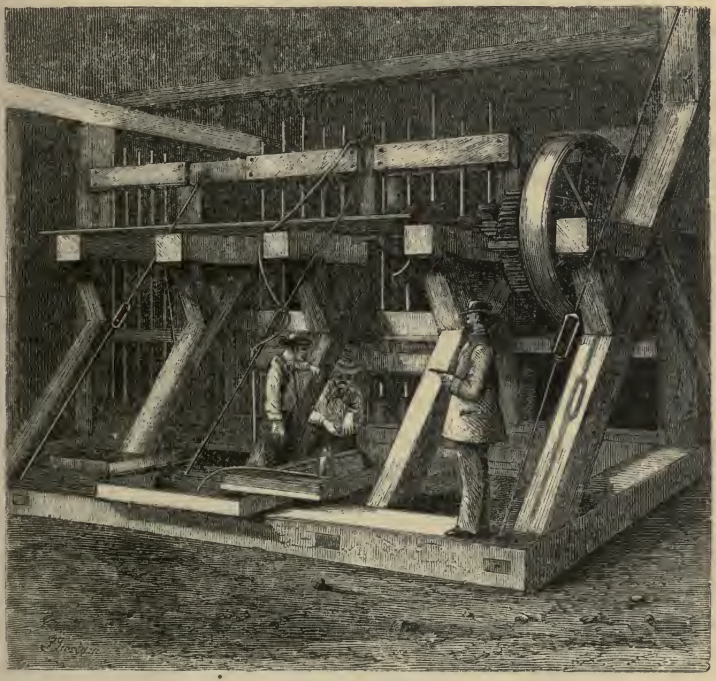
Looking down from the sides of the San Lazaro Mountain, we saw before us an extensive pine wood, covering some 800 acres, in a valley at our feet. The timber was of remarkable size—unusually large for any country, but a most valuable rarity in such a district as this. The question of railway ties, for many a long mile, both east and west of us, was here answered at a glance.

Bidding adieu to our friends at the Real de San Francisco, we passed on to see the works of the New Mexican Mining Company, seven miles distant, in the centre of the Old Placers. Here we were welcomed by Dr. Steck, the superintendent, who took us over his stamp-mill, which we saw at work, and explained to us the process of gold extraction through all its stages.

The engraving is taken from a photograph which I took of this mill, and shows the different parts clearly. The ore, after being broken into small pieces, is thrown into the long troughs into which the three sets of crushers—five to a set—descend. The crushers are given a rotatory motion as they fall, so that they grind and crush the ore at the same time. When the ore has been reduced to a muddy slime by mixture with water under the crushing process, it percolates through sieves into the shallow copper trays which are seen in front of the picture. These trays are coated with quicksilver, which sucks up the gold, swells to thrice its size, and forms an amalgam containing about two-thirds gold. This is scraped off, tied up in a piece of rag, and placed in a crucible for reduction. A dull red heat is necessary to drive off the

quicksilver and leave the gold behind it in a state of purity. The men in the foreground are in the act of cleaning the copper trays with cyanide of potassium preparatory to re-coating them with a thin film of quicksilver.

We next visited several of the mines, the chief of which were the Ramirez and the Ortez. From the latter a tunnel



A Gold Quartz Mill.

and tramway had just been completed, and the ore was being extracted in considerable quantities, and transported with rapidity and cheapness to the mill, a distance of two miles. The average yield, including all qualities of ore and quartz, just as it comes out of the shaft, exceeds 20 dollars a ton, and often rises as high as 27 dollars. For one quartz

vein that is worked, there are dozens in these mountains as yet undeveloped, and probably hundreds still unknown; for everywhere, as we rode along, we noticed the quartz veins cropping out along the hill-sides. Nor are the gold and silver lodes the only minerals worthy of notice. In the New, as well as in the Old Placer districts, there are some magnificent veins of iron ore, upon one of which, 7 feet thick, we went through the process of "taking up claims" for about 1,000 feet. It was strongly magnetic, and specimens examined gave, on analysis, 65·27 per cent. of iron. Some pieces of carbonate from the Old Placers gave, on analysis, 36·49 per cent. of pure metal. There is plenty of lime hard by.

The copper ores, although abundant, have really been scarcely noticed by the miners, except in the instances where they contain gold to a very considerable amount. In like manner, the argentiferous galena, also very abundant, has only been examined for the sake of its silver, the lead having been ignored altogether as an article of commerce. Judging from the perseverance of the early Spaniards in working the silver mines in the Zandia Mountain, their profits must have been very great.

Lastly, on the New Mexican Mining Company's estate we visited a coal-bed of great interest.

The section of the exposure, as examined by our geologist, is the following:—

	Ft.	In.
Top of hill, grey porphyry, composed of orthoclase, with small crystals of black hornblende.		
Yellow sandstone	12	0
Shales, somewhat baked in places	10	6
Anthracite coal	1	6
Anthracite metamorphic slates	1	6
Anthracite coal	2	6
Shales	6	6

Then came another exposure of anthracite coal, 14 inches of

which were alone visible. Shales, stones, and débris, covered the remainder.

Analysis of Placer Anthracite Coal.

Fixed carbon	88·91
Volatile materials	3·18
Water	2·9
Ash	52·1

proving it to be by far the best coal yet found west of the Mississippi. Since our visit, more anthracite coal veins have been discovered. The new superintendent (Mr. A. L. Anderson) writes that on November 30th he exposed 7 feet of a new vein, situated at a distance of three and a half miles from the mill; and discovered another narrower one, which he traced for one and a half miles along the Galisteo Creek.

Anthracite coal may be described as a natural coke. It is formed, no doubt, from ordinary bituminous coal, or from lignite, by the action of heat, and is always found in close proximity to well-marked signs of volcanic disturbance. In this locality it has been altered by contact with a porphyretic dyke, which has brought up to the surface the carboniferous limestone and superincumbent sandstone for miles along its track, as well as the coal itself, which crops out in many places besides that visited by us. The coal has a beautiful lustre, fractures easily into blocks, does not blacken the fingers when touched, and gives no smoke. The advantage of anthracite over bituminous coal is well known to those who enjoy the clear air and exquisitely clean interior of the houses in Philadelphia, where anthracite alone is used. If the anthracite of the Placer Mountains shall be found, as is most probable, well-suited for smelting the iron ore which abounds in its immediate neighbourhood, its value will be great indeed. It is, in fact, impossible to speculate upon the

destinies of such a region as this, when it shall be tapped by a railway. At present it is completely land-locked.

The price of carriage for machinery, to say nothing of setting it up, is enormous. Labour must be dear, when all manufactured goods, as well as food, are at least twice the price they are at the farthest limits of the railways. Very few enterprises have a chance of succeeding under such disadvantages, but with the completion of the railway all will be changed; and I cannot help predicting that these mountains will at some time, not far distant, become a great centre for the manufacture of iron, from which rails will be supplied to railways ramifying through Texas to Memphis, to Vicksburg and to Galviston on the coast; down the Rio Grande to the city of Chihuahua, up that stream to Taos, and into the heart of Colorado; perhaps also along the 32nd parallel, and down to Guaymas, on the Gulf of California, if not still farther to Toquivampo or Mazatlan.

Saturday, Sept. 13. After a ride of thirty miles over a most uninteresting plain, almost reduced to a desert from want of water, we came in sight of Santa Fé.

CHAPTER XIII.

SANTA FÉ.

The Town.—Spanish Nomenclature.—The Indian Paw-wow.—The Fonda.—Photographing the Fair Sex of New México.—Arrival of Surveying Party from the Mountains of Colorado.—The *Baile.*—Election of Delegate to Congress.—Railway Meeting.—Santa Fé Traders.—General Palmer and his Visitors.—Rides amongst the Mountains.

The fortnight spent at Santa Fé passed pleasantly and quickly away; and yet, although there was so much to see, to learn, and to do, now that it is passed, there seems but very little to relate. The town itself could never agree with the preconceived ideas of any one; for it disappoints you wofully on first appearance, being neither romantically situated nor picturesquely built, having neither broad streets, fine churches, nor quaint old houses. All, or nearly all, the dwellings are of one story; many of the largest cover several acres of ground, and all have verandahs running round the greater part of their circumference. They are all made of adobe, either white-washed or bare; and very comfortable they are, with their solid walls, cleanly-swept floors, and fine large rooms. There are three Roman Catholic churches, all more or less dilapidated, but containing some fine French painted glass windows and a few good paintings; a nunnery, a bishop's palace, and a Protestant church, minus its roof. Although Protestant zeal once burned sufficiently bright to raise the walls and tower to their proper height, it never succeeded in giving the building a roof. The plaza is beautifully shaded with rows of cotton-wood trees, which surround a large grass plot, with a

pagoda in the centre for the band. Around three sides of this square stand the principal shops and business houses; along the fourth stands the low pile of adobe buildings — 200 years old—which is still called the Palace. Much of this old palace was being cleared away when we were there; and the workmen found, amongst other curious relics, a smelting furnace, which had been completely bricked up on all sides; and from the ashes pieces of coal were taken out, showing that, more than a century ago, the Spaniards had discovered that mineral, and used it for smelting.

How strange the Spanish nomenclature seems to us! These champions of the Cross have stamped the names of their saints and the technicalities of their faith on every mountain and valley, river and plain; and, not content with this, they have exhausted the long catalogue of their saints and holy epithets in lavishly naming their children.

There is scarcely a family without a *Jesus*, or a village without a fair sprinkling of fallen *Angelletas;* and yet it may be because we cannot realise without an effort the symbolic meaning of many of these terms, that they appear to us almost like wholesale blasphemy, disguised though they be in euphony —sugar-coated by what Byron would call "the soft bastard Latin that melts on the tongue." Santa Fé, the "City of the Holy Faith" was, when christened, the only spot in the midst of a new realm of pagans upon which the Cross stood, and from which the light of Christianity shot its rays into the moral darkness around. Far up in the mountains, some Jesuit missionary, travel-worn and exhausted, encountered the farthest source of the Rio Grande; and after a refreshing draught of its cool, sparkling waters, he crossed himself, and called it, in thankfulness, "El Sangre de Cristo." A little lower down, two streams joined it; and here some

pious monk built his hut, recognised the symbol, and called it, from the meeting of the waters, "Trinidad"—the Trinity. Another reared a cross in a beautiful valley, and called it "Santa Cruz;" while some early settlers almost thought they were ensuring a blessing for their posterity when they christened their poor shanties Santa Domingo, Jesus Maria, Spirito Sancto, and the like. Apart from Scripture names, many applied by the Spaniards are very happily chosen. There is the Manzana Mountain, celebrated for its oak trees; the Zandia, shaped exactly like a huge water-melon. There is the "Jornada del Muerto," or journey of death; and there is the little village at the point where this arid trail reaches the Rio Grande, aptly named Socorro.

Compare these with the names we find all over Colorado—"Tarryall Ranche," "Cash Creek," "Gulcher Diggings," "Buckskin Joe," "Fair-play," "Strip-and-at-him Mine," "Hooked Man's Prairie," and the like—and we have about as great a contrast as exists in reality between the rough, manly Saxon pioneer and the indolent, superstitious Mexican.

The first excitement on our arrival was an Indian "paw-wow," which happened most opportunely. During the morning, a party of Navajo warriors, headed by the chief, Ben-hor-cita, came into town to arrange some matters relating to their brethren; and, not long afterwards, one of the most enterprising of the Comanche chiefs came with his wife—a Mexican by birth—to trade with some of the merchants. It happened that of late the Comanches, who are a very warlike race, had been harassing the unfortunate Navajos at the Bosque reservation on the Rio Pecos, where they are kept by the Government, and causing thereby a great deal of suffering and ill-feeling; for the Navajos, having been at last subdued by the military, were now in so deplorable a condi-

tion that they could no longer protect themselves against the neighbouring savage tribes. So the paw-wow was got up to try to induce this Comanche chief to return to his people, and persuade them to keep the peace with the Navajos.

All the warriors were brightly painted and fantastically dressed; they sat around the room, and after much talking—at which the Mexican wife, being general interpreter, was spokesman on both sides, and seemed to arrange everything completely to her own satisfaction—a lasting peace was agreed upon, and each party pledged themselves to return to their own people and try to obtain a ratification of the compact. Then followed much embracing and the presentation of gifts, which consisted in the exchange of hats, skins, pistols, tomahawks, quivers, and all sorts of unmentionable garments, between the old chief and his wife on one side, and the Navajos on the other, so that the former became attired and armed with the clothes and weapons contributed by their different friends; while their own clothes, regardless of sex, were dispersed amongst half-a-dozen or more of the Navajo braves. This scene ended, all squatted down upon the floor, and the pipe of peace was lighted and handed round for each to take a whiff.

But the Comanche chief was glum and thoughtful, and deep forebodings weighed heavily upon his countenance. At last he rose up, and through his wife made, no doubt, a most touching and eloquent harangue, the purport of which was that, being in the minority, he much feared he could never reach home to conciliate his people; for the others would overtake him on the way and kill him, as his great age and failing strength would not allow him to escape out of their hands. Then the Navajo chief rose with much dignity to reply, and, placing his hand on his heart, said that he

mourned his dear brother should think so meanly of him. Then pointing to the sun, he said that he hoped the good Spirit now looking at him would take his life and that of his whole family if he did not keep good faith with his dear brother. At this Ben-hor-cita, trembling with emotion, threw himself, weeping, into the embrace of the Navajo chieftain;

Navajo Braves.

then, taking off a magnificent cocked hat, adorned with a large shiny piece of tin in front, he placed it on his head, and this brought the paw-wow to a most successful climax.

Notwithstanding the protestations of friendship, old Ben-hor-cita thought it prudent to steal away during the night; and although I watched him closely, in order that I might secure his photograph before his departure, he escaped me.

I found the *fonda*, or hotel, very comfortable: the bedrooms were large, usually containing each three beds. Mine opened upon the court-yard, and as light was admitted by a trap-door at the top, which also acted as a ventilator and could be put up or down at pleasure, I converted my chamber with ease into a dark room, and used the court-yard as my photographic studio. Thither, in the morning, I brought the Navajos, and with a good deal of difficulty and persuasion obtained a capital group, the most conspicuous object in it being the admiral's cocked hat and tin ornament worn by the chief. I then let them mount their horses, and took another view of them in travelling rig.

The photographic studio was kept going all the time, and whenever I could decoy a Pueblo Indian wandering about the street, or a picturesque little black-eyed señoritta, or any other study into my net, they did not escape without leaving an impression behind them. The fair sex were rather hard to manage, as they had an idea that they were turned upside down in the camera, and strongly objected to such a liberty being taken with them. Often, after spending much time and trouble in collecting and forming a group, some knowing one would start this idea, and all would run for their lives, and hide.

Early on the morning of the third day after our arrival at Santa Fé, two of our friends came into the fonda—Calhoun and Imbrey Millar—whom we parted with at Fort Lyon; and before evening all Millar's party arrived safe and sound, but much travel-stained and almost shoeless, from their mountain explorations. After leaving us at Fort Lyon, they had followed up the Arkansas and its tributary, the Huerfano, through the Sangre de Cristo Pass to Fort Garland, a military post in the centre of the Rocky Mountains of Colorado; and

after examining some of the most favourable passes which lead from the heads of the Huerfano to the sources of the Rio Grande, they followed the latter stream for 200 miles down to Santa Fé. Next day they started for Fort Craig, almost the same distance farther south; so they had little time to enjoy Santa Fé. Calhoun, however, remained with us. He was the most dilapidated fellow I ever met; for, during a six weeks' tour far away to the north of Garland, he had carried nothing but his saddle-bags, had left his horse in the safe keeping of his friends, the Ute Indians, and had suffered many privations and hardships. We were very glad to meet again, and, by way of seeing a little of Mexican life, went to the *baile* in the evening.

This was a strange sight. In a room about sixty feet long by twenty wide, was collected at about nine o'clock a very considerable proportion of the youth and beauty of the town, which, however, is not paying the fair sex present any particular compliment. They wore roboses, often gracefully thrown over their heads, gay coloured dresses, big brooches and pendant earrings, smoked sigarettas incessantly, and sat quietly on forms placed around the room, waiting for any one who should choose to ask them to dance. The band occupied a platform at one end of the room, and consisted of a clarionet, a French horn, and three large brass instruments which groaned out the bass. At the other end of the room, slightly partitioned off, stood the bar, and it was customary at the conclusion of every dance to take your fair charmer to the counter and pay an exorbitant sum for sweetmeats, fruit, wine, or cocktails, as the case might be. In fact the luxury of each dance represented half a dollar, which, being interpreted, means "one-and-six;" thus, although no admittance is paid at the door, a reckless votary to the giddy dance would find

his evening's amusement rather expensive. The dancing, however, was well worth watching; for those sun-burnt brunettes glide most gracefully through the languid and suggestive movements of their Spanish dances. An occasional quadrille was formed in honour of the Americans present; and thus the evening passed away with—quadrille, drinks—slow waltz, drinks—Spanish reel, drinks—mazurka, drinks—and so on, with sigarettas *ad libitum*.

The Delegate to Congress for New Mexico was elected during our visit, and caused for the time a great deal of excitement. The inhabitants here know or care very little either about the squabbles between North and South, the nigger question, or the fundamental difference between a Copper-head and a War-Democrat. Mr. Clever represented the American party, whose motto was of course "Progress." Mr. Chavez, his rival, was a Mexican, and advocated the individual interests of the large landowners, who felt the raid against peonage, and the increased price of labour caused by the developing influence of the new-comers to be greatly prejudicial to their interests. The American party for the first time carried the day, and their victory was commemorated by a ball to Clever and Progress, and other appropriate rejoicings. Some of the young ladies who were present we had met before at Fort Union; they did not consider a hundred-mile drive at all too long for so great an occasion as the Santa Fé ball. In this I quite agreed with them.

Then we had of course a railway meeting, at which everything was said that could be said to enlighten the populace, and to explain to them the wonderful results to be expected when "El cameno de fiero caril" should traverse the territory. The speeches had all to be re-delivered in Spanish by an interpreter, and so impressively was the subject put that

none could help seeing that their fortune was only a matter of time provided the railway passed near enough to their properties. This difficulty was easily overcome by promising any number of branch lines, and thus the meeting ended most auspiciously, and all the resolutions were in due form carried unanimously.

A large proportion of the traders are of German-Jewish extraction, and, taking them all in all, they are by no means a bad set of fellows, and are well suited to the position they occupy at the farthest outskirts of the commercial world. Their stores are well filled with everything required by the emigrant, and a good deal of rubbish to meet the demands of the Indian population. A large trade is done in paint and brass jewellery, and a still larger one was formerly done in fire-arms, some specimens of which I examined with great curiosity. The wholesale price of the single-barreled guns was two and a half dollars each, and they could not possibly go off without bursting. However, since the Navajos have been "improved" off their country, the market for this kind of goods has ceased, and as Northern Mexico no longer produces the vast hoards of precious metals which formerly enriched its inhabitants, the Santa Fé trade has degenerated to local insignificance, and the great Santa Fé trader has now joined the other romantic characters of by-gone days. No doubt he will again reappear on the scenes, but so changed that we shall scarcely recognise him; he will wear a frock coat and a linen shirt; his goods will come by steam; and his stories will relate, not to Indian fights, but to railway accidents.

It is needless here to mention the hospitality shown us by the military, the bar, and the traders; suffice it to say we did not leave without many regrets, knowing that there was but little chance of our ever meeting those hearty Western friends

again. Poor Judge Slough, the chief justice of the territory, who was amongst the kindest of our hosts, was shot in a duel at the fonda before we had reached San Francisco. The quarrel originated out of some political dispute at the election of delegate. Not long since, an indefatigable traveller came back from his explorations about the 35th parallel; he also stopped at the fonda, and while collecting additional information at Santa Fé, was stabbed in the gambling room of the hotel, and all his papers perished with him.

General Palmer held quite a levée here. His rooms were always crowded with men either interested in the railway or well acquainted with some portion of the country to the westward. Here all possible information was obtained both about the 32nd and 35th parallel routes, and the relative advantages seemed from the reports to be so evenly balanced, that the General decided finally that both routes must be separately examined, and that some of the surveyors must retrace their steps from Fort Craig, while others were immediately sent for from the States.

When tired of work, Palmer, Colton, and myself would saddle our horses and ride up the mountains, amongst the silver spruce and pine forests, and enjoy to the utmost the enchanting climate. Santa Fé stands at an elevation of about 7,000 feet above the sea, and the great eastern main chain of the Rocky Mountains ends in some fine bold spurs a little to the north of the town. Every day was cool, calm, and cloudless, the atmosphere was so clear and sparkling that it was a perfect luxury to allow the eye to wander far away over the vast tracts of country which lay at our feet as we climbed up the mountains; and to contrast the undulating plain on one side, the broken rugged country on the other,

and the granite peaks, which rose abruptly into the blue sky, at our back.

Photography and railway business occupied most of my time at Santa Fé, but I became very much interested in the Indian question, and there collected the greater part of the material from which the following account of the native races has been compiled. The five next chapters also embody the result of my subsequent travels amongst different tribes, and I think the advantage of representing the subject as a whole, greatly overbalances the slight inconvenience of being obliged to anticipate a few of the incidents which occurred later on in the narrative.

PART II.

THE NATIVE RACES OF NEW MEXICO.

THE

NATIVE RACES OF NEW MEXICO.

CHAPTER I.

THE SEMI-CIVILISED TRIBES.

Four distinct races are encountered in New Mexico:—*The Pueblo* (or *town*) *Indians* are the most remarkable.—Our first introduction to them.—The Pueblos of the Rio Grande Valley; Dress, Government, Religion, Traditions, &c.—Indian Towns composed of Houses having but one story.—Fortified Towns: Laguna (two stories), Acoma (three stories), Pueblo of Toas (seven stories), Zuñi (six stories).—The Inhabitants of Zuñi; Manners, Customs, Arts, Agriculture, &c.—The seven Moqui Pueblos (all fortified towns of three stories).—Elaborate system of Irrigation adopted by the Moqui Indians.—The Pimas of the Rio Gila, their Dwellings, Productions, Manufactures, Wealth, Manners, past and present Condition.—The Papagos, great Traders, Conversion to Christianity.

Arizona was separated from New Mexico in 1863; it is desirable, however, for the present purpose, to consider both Territories as a whole.

Four distinct races are now encountered by the traveller in New Mexico. These are:—

	Population.
1. The Americans	about 13,000
2. The Mexicans	,, 75,000
3. The Pueblo Indians	,, 16,000
4. The Wild Indians	,, 23,000
	127,000

The semi-civilised native races and their natural enemies require to be described separately. The Pueblo, or town Indians, are the most remarkable and important tribe to be found in any part of the United States or Canada; they are,

in fact, the only native race whose presence on the soil is not a curse to the country.

Whilst on the plains, whatever belief we had in the nobility of the red-skin, or the cruelty of the frontier man, quickly vanished, and we learnt to regard the Indian of the plain as the embodiment of all that was cruel, dastardly, and degrading. We were not long, however, in the Rio Grande valley before we encountered a new race, as different from our old enemies as light from darkness.

I first met a small party of these people on the plain a few miles west of the Pecos; they were neatly dressed in buckskin shirt and breeches, which latter fitted tightly to their legs; they wore moccasins on their feet and a girdle around their waist. Their heads were bare, their black hair was cut square in front almost to the eyebrows, and gathered up behind into a queue bound round with red cord; a narrow band also passed over the hair in front and was fastened underneath. They were short in stature, thickly built, with quiet, intelligent faces and large sorrowful eyes. I never, during my residence in their valley, saw a Pueblo Indian laugh; I do not remember even a smile. They carried no arms that we could discover, but each pushed before him a little hand-cart composed of a body of wicker-work on wooden wheels, filled with grapes, the produce of their vineyards. They were on their way to Los Vegas, and seemed so sure of a good market, that we had to pay ten dollars for a large basket of grapes weighing from fifty to eighty pounds.

At Santa Fé I watched these people coming and going, bringing their produce in the morning—peaches, grapes, onions, beans, melons, and hay—for sale, then buying what necessaries they wanted, and trudging off in the afternoon quietly and modestly to their country villages. I looked on

them with pity, and wondered what they thought of this new state of things, and how they liked the intruders whose presence they bore so meekly. I met Mr. Ward, their agent, who treats them as the kindest father would his children; and often went to his house, where Indian parties from a distance were sure to resort for information and advice. When I left Santa Fé I passed through many of their villages, saw them in their houses, visited their fields and vineyards, and watched them as they assembled on their housetops at sunrise to look for the coming of Montezuma from the east.

The semi-civilised Indian of the United States is only to be found in New Mexico and Arizona, south of the 36th parallel of latitude, nor is there any proof whatever, but merely some vague traditions, to show that he ever came from the north, or spread farther northward than the Rio Grande valley and the accessible branches of the San Juan River. In these two territories—together, equal in size to France—only five small remnants of this once powerful nation remain at the present time. These are:—

1. The Pueblo Indians of the Rio Grande valley; population, 5,866.

2. The Indians of Zuñi, situated about latitude 35°, longitude 108° 50′, with a population at present of 1,200 souls.

3. The Indians of the seven Moqui pueblos, situated about 150 miles north-west of Zuñi; population 2,500.

4. The Pimas of the Gila valley, occupying eight villages; population, 3,500.

5. The Papago Indians of the regions south of it, occupying about nineteen villages, and numbering not less than 4,000 in all.

The Pueblo Indians of the Rio Grande valley were early

converted to Christianity by the Spanish missionaries. Each pueblo has its church, built of adobe, and dedicated to its patron saint. An exact copy of one of their churches is given in the engraving.

The following table was kindly furnished me by Mr. Ward; it clearly shows the state of the population during three quarters of a century:—

TABULAR STATEMENT OF INDIAN PUEBLOS (VILLAGES) WITHIN THE TERRITORY OF NEW MEXICO.

No. of pueblos.	Names of pueblos, with the names of their respective patron saints.	Census.					Spanish grants in acres.	Date of grants.
		1790.	1809.	1850.	1860.	1864.		
1	Taos, San Geronimo de	518	527	361	363	361	17,560	1689
2	Pecuries, San Lorenzo de	254	313	222	143	122	17,460	,,
3	Abiquiu, San Tomas de	216	126	...	...	...	...	
4	San Juan de los Caballeros	260	208	568	341	385	17,544	,,
5	Santa Clara	134	220	279	179	144	17,368	,,
6	San Ildefonso	240	283	139	154	161	17,292	,,
7	Pojuaque, Nuestra Señora de Guadalupe de...	53	000	48	37	29	13,520	,,
8	Nambé, San Francisco de	155	133	111	103	94	13,586	,,
9	Tesuque, San Diego de	138	160	119	97	101	17,471	,,
10	Pecos, Nuestra Señora de los Angeas de	152	000	...	...	...	...	
11	Cochiti, San Buenaventura de	720	697	254	172	229	24,256	,,
12	Santa Domingo	650	720	666	261	604	74,743	,,
13	San Felipe	532	405	411	360	427	34,766	,,
14	Sandia, Nuestra Señora de los Dolores de	304	364	241	217	197	24,187	1748
15	Isleta, San Agustin de la	410	487	751	440	786	110,080	,,
16	Belen, Nuestra Señora de la	000	133	...	...	...	...	
17	Santa Ana	356	550	399	316	298	...	
18	Zia, Nuestra Señora de la Assumpsion de	275	286	124	117	103	17,514	1689
19	Jemes, San Diego de	485	297	365	650	346	17,510	,,
20	Laguna, San José de la	668	1,022	[illegible]'9	927	988	...	...
21	Acoma, San Estevan de	820	816	350	523	491	...	...
22	Zuñi, Nuestra Señora Guadalupe de	1,935	1,598	1,500	1,300	1,200	...	...
		9,275						
	Within the jurisdiction of El Paso.							
1	Seneca, San Antonio	410	...	...	...	...	...	...
2	Isleta, San Antonio de la	430	...	...	...	...	...	...
3	Socorro, Nuestra Señora del	620	...	...	...	...	...	...
4	San Lorenzo del Real	440	...	...	...	...	...	...
26	Total	11,175	9,345	7,657	6,700	7,066		

NOTES.—The censuses of 1790 and 1809, were taken by order of the Spanish authorities. This duty was usually performed by the missionaries, or parish priests, residing among the Indians; hence, there is every reason to believe that they were accurately taken.

The censuses of 1850 and 1860 were taken by the deputy marshals, appointed for the purpose by the United States; and those of 1864 were taken by me, at which time I visited all the pueblos, Zuñi excepted; but my previous visits to, and knowledge of, this pueblo, warrant me in placing the number of its inhabitants at the figures inserted in this return.

To read the names of the pueblos properly, they must be read thus: San Geronimo de Taos, San Lorenzo de Pecuries, and so on, except Nos. 4, 5, 6, 12, 13, and 17, which must be read as they are inserted, and also San Lorenzo del Real.

Ciphers indicate no census given during the date under which they are inserted.

The dots opposite to the names of the three respective pueblos are simply intended to fill space, those pueblos having been out of existence for many years.

SANTA FÉ, NEW MEXICO, *July* 10, 1867. JOHN WARD, *Special Agent for Pueblos.*

Vincent Brooks Day & Son, lith.

PUEBLO INDIANS OF THE RIO GRANDE VALLEY

Most of the above villages are in the main valley. Others, such as the Pueblos de Toas, Laguna, Acoma, San Domingo, and others, occupy isolated positions on some of the tributary streams. The villages in the Rio Grande valley differ but little from those of the Mexicans, except that the houses are larger and loftier. They are usually of only one story, but each house is capable of containing several families; the roofs are flat, and at different corners of the village watch-towers rise above the roofs. In the centre of the chief house in the village, a good-sized room, partly formed by excavation into the earth, is usually to be found. This is the *estufa*, or place of worship, where the sacred fire was formerly kept burning, and where all religious services used to be held before the Indians became Christians. Now it is used in most villages only as a council chamber; but Colonel M'Léod, of Santa Fé, assures me that in some places the sacred fire is still kept burning, and that on one occasion he was permitted to visit an estufa where it continues to exist.

Each pueblo has a separate government of its own, consisting, first, of a *cacique*, or governor, chosen from amongst the men advanced in years—the sages, in fact. The cacique holds office for life, he presides over the council, and is chosen for his wisdom. His decisions are usually adopted. Secondly, a war captain is selected from amongst the braves, who arranges all campaigns made against an enemy, and through his lieutenant—or master of the horse, as we should call him—has the management of the *nahallada*, or horse-herd. Third, the fiscal-major and his assistants regulate church matters, repair the churches, &c. The old and experienced men collectively are the law-makers, and elect all officers except the cacique, who is chosen by universal suffrage. The people of the villages do not all speak the

same tongue, and they resort to the Spanish language, which they acquire with tolerable facility, as a common medium of communication. The Pueblos form five groups, if classed according to dialects.

1. Pueblo de Toas, de Pecuries, Sandia, and Isleta.

2. San Juan, Santa Clara, San Ildefonso, Nambé, Pojuaque, and Tesuque.

3. Cochiti, San Domingo, San Felipe, Santa Ana, Silla (Zia), Laguna, and Acoma.

4. Jemes.

5. The pueblo of Zuñi. Those of the Moqui pueblos speak the same dialect as that of Jemes. The Spanish missionaries found little difficulty in teaching these natives to read and write, but since the decay of religious establishments throughout Northern Mexico education has been arrested, and now not a single school exists in any of the pueblos.

In religion they are, to outward appearance, devoted Roman Catholics; the few priests who still work amongst them are Frenchmen, and are much respected and beloved. The rites of baptism, marriage, and burial take place in the village church, and they keep the feast-day of their patron saint with great festivities.

The isolated pueblos, which lie at considerable distances from the main valley, are very different in appearance from those simpler one-storied villages which once dotted the banks of the Rio Grande del Norte in very considerable numbers. In these, the distinctive peculiarities of the native fortifications are very striking. Laguna, on the Rio de San José, is built on the summit of a limestone cliff, some forty feet high, possessing considerable natural advantages for defence. The houses are mostly of stone plastered over with mud, and two

stories high. Neither windows nor doors are to be found on the outer wall of the first story; the second rises a little back from the roof of the first, leaving a ledge in front of it. Ladders are used to mount to this ledge; they are then drawn up, and the rooms are entered either by openings in the roof leading to the ground-floor, or by doors giving entrance from the ledge to the second suite of rooms; the latter alone are used for sleeping. Store-rooms occupy the ground-floor.

In 1858 there was a Baptist minister at Laguna; and in one of his reports to the Indian department of the Secretary of the Interior he stated that the amount of real Christianity amongst the Indians is very small; they cling to the religion of their forefathers, and can only be induced to attend the service of the Roman Catholic Church by threats, promises, and even blows, whereas they perform their own religious duties with the utmost regularity. He also joined in the universal eulogium on the honesty and sobriety of the men, and the virtue of the women.

Acoma, some twenty miles west of Laguna, is a large and very interesting pueblo. It rests on the summit of a flat mesa, whose perpendicular cliffs rise to a height of from 300 to 400 feet above the valley. The houses here are three stories high, built on the usual principle, each successive story being smaller than that on which it rests. Ladders are also used to reach the ledges. The flat top of the mesa includes about fifty acres of land; it is reached by a steep winding path cut in the rock, and so placed as to be easily defended. It is a very wealthy pueblo; the Indians own abundance of cattle, and grow large quantities of corn, peaches, pumpkins, and other produce.

The houses of San Domingo, Sandia, and others, although

only built of one story, have no doors or windows on the outside, but are entered by ladders from the roof.

The ancient pueblo of Toas consists of one compact fortress, formed of terraces seven stories high, and built on a rock overlooking the stream. So strong was it as a place of defence, that, in 1847, when the Mexicans of the village of Toas could no longer defend themselves against the Americans, they betook themselves to the Indian pueblo a few miles distant, and there sustained a protracted siege, yielding at last only when provisions had utterly failed. This pueblo, moreover, was never taken by the Spaniards, although it was many times attacked.

Venegas, Coronado, and, in fact, all the early Spanish explorers and writers upon New Mexico, describe numerous many-storied fortresses now no more, and give many instances of the great bravery shown by the Indians in their defence. Those I have mentioned, however, with the exception of Zuñi and the seven Moqui pueblos, are the only native fortresses which now remain inhabited.

The most interesting of all the pueblos is undoubtedly Zuñi. The engraving, which is copied from a photograph, gives a good idea of its general appearance. It is built on a rising ground, affording an extensive view of the surrounding country, and six terraces at least can be counted one above the other. Ladders planted against the wall give access to the different terraces upon which the doors of the apartments open.

In the valley through which the Zuñi River (a tributary of the Colorado Chiquito) flows, are to be seen orchards—chiefly of peach trees—vineyards, fine corn plots, and vegetable gardens, producing onions, beans, melons, chili colorado (red pepper), pumpkins, &c. Formerly cotton was cultivated,

Vincent Brooks Day & Son. lith.

ZUÑI.

probably by Indians farther south; but now they obtain what stuffs they require from the Mexicans in exchange for farm produce. They do not raise their crops by irrigation, but depend entirely upon the rain-fall; hence all their traditions relate more or less to the production of water.

Not far from the town is a sacred spring, about eight feet in diameter, walled round with stones, of which neither cattle nor man may drink. The animals sacred to water—frogs, tortoises, and snakes—alone must enter the pool. Once a year the cacique and his attendants perform certain religious rites at the spring; it is thoroughly cleared out; water-pots are brought as an offering to the Spirit of Montezuma, and are placed bottom upwards on the top of the wall of stones. Many of these have been removed, but some still remain, while the ground around is strewn with fragments of vases which have crumbled into decay from age.

Not far from the present pueblo is a lofty mesa, which rises about 1,000 feet perpendicularly from the plain; upon this are many ruins of houses and a sacred altar, constituting all that remains of old Zuñi.

The following tradition is related about this place:—Long before the first appearance of the white man, a dreadful flood visited the land. Waters gushed forth from the earth, and huge waves rolled in from the west, drowning man and beast; even the wild Apaches and Coyotes did not escape. Then many of the people of Zuñi rushed to the lofty mesa, but many more perished in the waters. Night came, and yet the waters rose higher and higher, until they reached the water-mark still distinctly visible high up on the cliff wall. The great Spirit was very wroth with his people, and must be appeased by a fitting sacrifice. So the son of the cacique and the most beautiful maiden in the tribe were bound and

lowered down into the seething flood; then the waves abated and the remnant of the people were saved. The young man and the maiden were transformed into two lofty pillars of stone, which rise from a natural battlement on one part of the summit. Time has worn these two pillars into four. They are still greatly venerated by the people of Zuñi.

After building a town on the lofty mesa, they lived there for many years; but as it was far removed from their fertile bottom-lands, and as no second flood visited their country, they returned to their present abode. When the Spaniards, however, made war against them, they fled for a second time to their ancient stronghold, and, according to their own account, made a fierce resistance, by fortifying the only two approaches by which the summit could be gained, and by hurling huge stones upon their assailants; the enemy, however, was victorious.

Spanish influence was never strong enough at Zuñi to convert the natives to Christianity; they tolerated the presence of a church outside the walls of the pueblo (now a ruin), but they still cling devotedly to their old traditions, and attribute their temporal prosperity, and the comparative immunity of their country from drought, to the steadfast observance of their ancient ceremonies. They believe in the one great Spirit, and in Montezuma his son, who will some day come again to them from the east, and unite all the nations once more under his banner.

Our party found the people of Zuñi to be very honest, but uncommonly sharp traders, so much so that they had the greatest difficulty in buying any sheep from them, although they had flocks in abundance; they parted with their maize and farm produce much more readily, but they understood the value of everything so thoroughly that they always insisted

on receiving *quid pro quo*. They seemed to take great pleasure in keeping tame eagles and turkeys. Albinos are unusually common amongst them, whose complexions are as fair as those of Europeans. Like the other branches of the Pueblo Indians, the women of Zuñi are very chaste, and plurality of wives is not allowed.

Situated to the north-east of the San Francisco Peaks, about twenty miles from the Colorado Chiquito, on the opposite side to the mountains, are grouped, within a radius of ten miles, the seven villages of Moqui. The country is arid and uninviting, much broken, and partly formed of steep mesas, partly of volcanic peaks. Upon the very edge of some of these mesas the villages are planted. They are mostly of three stories, built in the form of a square, with a court, common to the whole community, forming the centre. The first story, or basement, consists of a stone wall 15 feet high, the top of which forms a landing extending round the whole. A flight of stone steps leads from the first to the second landing, and thence up to the roof. The doors open upon the landing. The houses are three rooms deep; the first being used for eating, cooking, &c.; the others as sleeping apartments. Great neatness is observable both in the household arrangements and personal habits of the people. They sit upon skins on the floor, clothe themselves with linen trousers, shirts, and a Navajo blanket thrown across their shoulders. Upon the walls hang bows, arrows, quivers, antlers, blankets, articles of clothing, &c.; vases, flat dishes, and gourds, filled with meal or water, stand usually along one side of the room. In complexion they are rather fair for Indians; although quiet in their manners they are very light-hearted; honesty, frankness, and hospitality are amongst their good qualities, but they want the manly bearing of the Zuñi Indians, and have,

until lately, lived in great fear of their warlike neighbours, the Navajos.

The most interesting features about their villages are the reservoirs which they build to retain the rain-water. At the back of each building, upon the mesa itself, a good-sized reservoir, some five feet or upwards in depth and lined throughout with masonry, is usually to be found; a little lower down is a second one, with a pipe leading to it from the former. This lower reservoir is for the animals, the upper one for the people, and for household use. On each side of the tanks, the sloping sides of the mesa are formed into terraces neatly paved with masonry, and surrounded by a raised edge, so as to retain the water brought to them through pipes from the reservoirs. Peach trees grow upon the terraces, and most of their crops are raised in this way by carefully husbanding the rain-fall and using it for irrigation. Many flocks are owned by them, and most of the sheep are black.

Mr. Leroux, who was the first American to visit them (1850), estimated the united population of the seven villages at 6,700, the largest containing 2,400 inhabitants. Since then, however, small-pox has committed terrible ravages amongst them; and they have also suffered for several seasons from great deficiency of rain-fall; so much so that they have been strongly advised to migrate to some more hospitable region. Within the last six years, however, the rains have been more abundant, and by the latest reports from that out-of-the-way region, they seem to be in a very flourishing condition. Mr. Ward, however, after a careful inspection of the different communities, places the present population at only 2,500 souls.

The next group of semi-civilised Indians—the Pimas of the Rio Gila—differ from those I have already named, in that

they inhabit huts instead of houses. In all other respects they are very similar.

After the Rio Gila has emerged from the succession of deep gorges through which it crosses the Pina-leño Cordilleras, it waters a rich and fertile valley forty or fifty miles long, between the mountains and the Gila desert. About twenty miles of this valley is occupied by these people. They devote themselves entirely to agriculture and to the arts of peace, but they are brave in war, and maintain a complete military organization for protection against the incursions of their wild neighbours, the Apaches. I have often heard it said by Western men, that there are only two spots in New Mexico and Arizona where you can be certain of absolute safety; the one is in the pueblo of Zuñi, the other amongst the Pimas on the Rio Gila. Both these peaceful tribes have been most useful allies of the United States troops in their expeditions against the Navajos and Apaches; it has, indeed, been only through the assistance of the Pima warriors that any success has ever been gained against the latter sons of plunder.

The valley varies in width from two to four miles, and grouped up and down the stream, usually on ground a little above the level of the low-lying bottom-lands, are seen the cone-shaped huts which compose the villages. The huts are easily built, as they only consist of a framework of willow poles stuck in the ground, and arched over to meet in the centre; these are interlaced with others at right angles, and then covered with wheat-straw, neatly pinned down all round the sides, which may or may not be daubed over with mud, and nicely thatched at the top.

Were we to judge only from their dwellings, we should place these people very low down in the list of Indian tribes; but when we examine the means which they adopt for raising

their crops; when we see with what labour and skill they have divided off their lands into little patches of about 200 feet square, and have dug many miles of irrigating canals, each set radiating from the main artery, or "acequia madra," to supply every patch; then when we look at the pottery, the beautiful basket-work, the stores of farm-produce carefully packed away in well-made store-huts; when we see specimens of native weaving; and perhaps more than all, when we look at the soft intelligent faces of these Indians, we recognise directly the same people, to all intents and purposes, as we met in the Rio Grande valley.

The most complete list of the population I have been able to discover is that of Mr. G. Bailey, Indian agent for the Pimas and Maricopas, dated 1858. It is as follows:—

PIMAS.

Name of Village.	Warriors.	Women and Children.	Total.
Buen Llano	132	259	391
Ormejera, No. 1	140	503	643
,, No. 2	37	175	212
Casa Blanca	110	425	535
Chemisez	102	210	312
El Juez Farado	105	158	263
Arizo del Aqua	235	535	770
Aranca	291	700	991
	1,152	2,965	4,117

MARICOPAS.

Name of Village.	Warriors.	Women and Children.	Total.
El Juez Farado	116	198	314
Sacatost	76	128	204
	192	326	518

The productions are chiefly maize, wheat, beans, melons,

pumpkins, onions, chili colorado (red pepper), &c.; they own a small quantity of stock, horned cattle, sheep, horses, pigs, mules, and poultry. They rely, however, for support mainly upon agricultural produce, milk, and eggs; and their production is so much in excess of their requirements, that they dispose annually of more than a million bushels of grain to the government agents, at from four to six cents a pound, which, in our money, is nearly twopence. They formerly cultivated cotton, but now they find it far easier to buy the few cloth goods they require than to weave them.

Major Emory, of the United States regular army, was, I believe, the first American to visit these people in 1846, when, as Lieutenant Emory, he took charge of a military reconnaissance from Fort Leavenworth (Kansas) to San Diego, on the Pacific. He thus describes the scene: "We had no sooner encamped, eight or nine miles from the Pima villages, than we met a Maricopa Indian looking for his cattle. The frank, confident manner in which he approached us, was a strange contrast to that of the suspicious Apaches. Some six or eight of the Pimas came up soon after at full speed, to ascertain who we were and what we wanted. They told us that the first trail we had seen along the river was that of their people, sent to watch the movements of their enemies, the Apaches. Their joy was unaffected at seeing that we were Americans, and not Apaches, and word to that effect was immediately sent back to the chief. Although the nearest villages were nine miles distant, our camp, in three hours, was filled with Pimas loaded with corn, beans, honey, and water-melons, so that a brisk trade was opened at once. Their mode of approach was perfectly frank and unsuspicious; many would leave their packs in our camp and be absent for hours, theft seeming to be unknown to them. On reaching

the villages we were at once impressed with the beauty, order, and disposition of the arrangements for irrigating and draining the land. Maize, wheat, and cotton, are the crops raised by this peaceful and intelligent race of people; all had just been gathered in, and the stubbles showed that they had been luxurious. The cotton was picked and stacked for drying on the tops of the sheds. The fields are subdivided by ridges of earth into rectangles of about 200 by 100 feet, for the convenience of irrigating. The fences are of sticks, wattled with willow and mezquite, and, in this particular, are an example of economy in agriculture worthy to be followed by the Mexicans, who never use fences at all.

"In front of each dome-shaped hut is usually a large arbour, on the top of which is piled the cotton in the pod for drying. To us it was a rare sight to be thrown in the midst of a large tribe of what is termed wild Indians, surpassing many of the Christian nations in agriculture, little behind them in useful arts, and immeasurably before them in honesty and virtue. During the whole of yesterday our camp was full of men, women, and children, who sauntered amongst our packs unwatched, and not a single instance of theft was reported.

"I saw a woman seated on the ground under the shade of one of the cotton sheds; her left leg was tucked under her seat, and her foot turned sole upwards; between her big toe and the next was a spindle about eighteen inches long, with a single fly of four or six inches. Ever and anon she gave it a twist in a dexterous manner, and at its end was drawn a coarse cotton thread. This was their spinning jenny. Led on by this primitive display, I asked for their loom, by pointing to the thread and then to the blanket girt about the woman's loins. A fellow stretched in the dust, sunning

himself, rose up leisurely, and untied a bundle which I had supposed to be a bow and arrows. This little package, with four stakes placed in the ground, was the loom. He laid open his cloth, and commenced the process of weaving."

Each alternate thread of the warp is passed round a piece of cane, which, when lifted, opens a passage for the shuttle in the manner of a sley. The operator sits like a tailor, and, raising the sley with one hand, shoots the shuttle through with the other. The work is beaten up after the passage of each thread by the use of a sharp-toothed instrument made of hard wood. Such an operation is, of course, most tedious, and it is not surprising that even the very limited trade at present existing between the Indians and the outer world, should have caused its abandonment, as well as that of the cultivation of cotton.

The pottery manufactured by the Pimas varies in colour from red to dark brown; the articles made are limited to those which are absolutely necessary for domestic purposes. They consist of *ollas*, or vases, of every size, the largest containing about two pailfuls, the smallest half a pint; jars with small apertures resembling bottles, and basins of different sizes and shapes, from a milkpan to a saucer. All are more or less ornamented, and painted with black lines arranged in geometrical figures.

The basket-work is the most meritorious of all their native arts, for although the baskets are made only of willow twigs or of grass, so closely are they plaited that liquids are placed in them as a matter of course, and seldom a drop escapes through the sides. A wicker rim is always fastened at the bottom, by which the larger baskets can be carried on the head like the vases, and the smaller ones can stand securely on the floor. They are of all sizes, and together with the

pottery, form the great articles of exchange between this people and other tribes, the Mexicans being about the best customers of all.

Their only native weapons are bows and arrows, but they readily adopt all modern appliances either in the shape of fire-arms or implements of agriculture. The United States Government has, through its agents, supplied to them a considerable quantity of the latter during the last few years, by which means the annual produce of their farms has been greatly increased. As the ground is soft and friable, hoes, spades, and shovels are more in vogue than ploughs; and when any part of the valley shows signs of exhaustion, they give it rest, repair the old acequias which had previously been abandoned, and thus bring a reinvigorated patch of waste land again under cultivation.

Altogether, I may safely say that the present state of this industrious people is very satisfactory. Want is unknown amongst them; they are happy and contented; they are of great assistance to the colonists as well as to the government, for they help to confine the Apaches to their mountain retreats, and they supply the emigrants and troops with large quantities of corn. By the table of population already given, it will be seen that the women and children form a very fair proportion of the population; as for the latter, my friend Colton tells me that the whole valley swarms with them, and that these little monkeys are as full of fun as they can be. All this is encouraging, and leads us to hope that this people may escape the general destruction which, in North America especially, has fallen upon the aboriginal tribes with the advance of the Anglo-Saxon race. To attain so desirable a consummation two things are absolutely necessary:

First, that the government should make their lands by law inalienable.

Second, that the high standard of morality, which has ever been remarkable amongst the Pimas and their neighbours, the Pueblo Indians, should not be broken down by any close intercourse with white men and their fire-water.

A word or two now about the Papagos. The Papago country is large in extent, but for the most part a complete desert. It comprises all the country south of the Rio Gila, which lies between the head of the Gulf of California and that extensive cordillera of which the Sierra Catarina forms the most westerly range, and extends for some fifty to a hundred miles into Sonora. All over this tract, wherever there happens to be a stream, a spring, or a little marsh among the barren rock hills which thrust their peaks above the parched and friable ground, or any spot favourably suited for tank irrigation, there you are very likely to find a little colony of Papagos, living, if at home, in huts similar in all respects to those of the Pimas. I have been through their desolate country, and visited many of their villages, and I feel convinced that the hard struggle they have always had with nature to support life in such a region, has done much to develop the energy and manliness of character peculiar to the tribe. As a race, they are the finest specimens of man, *physically*, I have ever seen. On one occasion I met five of them at a ranche, and not one of the party measured less than six feet two inches. If they were not so very dark in complexion, their features would be pleasing, for they have the steady, intelligent eye, and straightforward manners of their more northern brethren, the Pimas.

The most interesting point in connection with them, however, is their mode of life. Like the Yaqui Indians of Southern Sonora, they very willingly leave their homes at certain seasons to gain a livelihood elsewhere. They

own flocks and herds in considerable quantities, and they keep large droves of horses, or rather ponies. It is probable that a number of their villages, especially those supplied only by artificial tanks, are uninhabitable from want of water for a great part of the year, so that they are obliged to migrate, to support themselves and their stock during the droughts. Be that as it may, they have become the greatest traders and the most industrious people to be found in the country. When the time for leaving their little patches of cultivated ground around the villages has arrived, some pack their merchandise, consisting chiefly of baskets and pottery similar to those made by the Pimas, on their ponies, and go down to Sonora to trade with the Mexicans, driving their stock with them to pasture in the comparatively fertile valleys to the southward. Others travel immense distances over the great Sonora Desert to the Gulf of California, and particularly to some salt lakes about a hundred miles west of Altar, where they lay in a stock of salt and seashells, and then return to trade with the Indians on the Colorado, or the Pimas on the Gila; or to sell the salt to the Mexicans on the eastern side of their country. Others, who have no merchandise to sell or ponies to trade with, go to the settlements and ranches from Tucson southward, and willingly hire themselves out as field labourers or miners. They work well for the Americans, and receive usually a dollar a day, which is certainly not bad wages. Then, when the time for planting comes round, they all return again to their own homes in the desert.

The Pimas resisted sternly all attempts made by the Jesuits or Franciscans to convert them, and are now so diffident on religious subjects, that they will not discuss them, or give any information respecting their belief. The Papagos, how-

ever, probably from the close intercourse which they have so long kept up with the Mexicans, are, to all appearance, most devout Roman Catholics. A description of, I may say, the cathedral of the tribe, will be found in a subsequent chapter. It is the last relic of the Papago mission of San Xavier del Bac, and is situated on the Rio de Santa Cruz.

Intercourse with the Mexicans has also much modified their mode of dress, for the men usually wear wide straw sombreros of home manufacture, moccasins, buckskin gaiters, a breech-cloth of cotton, and a snow-white cotton blanket thrown gracefully across the chest. The women wear petticoats, and neither sex seems to affect ornaments or paint. The number of villages scattered throughout the land of the Papagos is about nineteen, and the population of the entire tribe probably reaches four thousand, of which three thousand live north of the Mexican boundary line, and perhaps one thousand south of it. So effectually do the warriors protect their homes that the Apaches never have the courage to penetrate far into their country, although they have quite depopulated the Mexican settlements bordering it on the east.

CHAPTER II.

THE WILD TRIBES.

The natural enemies of the cultivators of the soil.—The Navajos, their Depredations.—History during the last twenty years.—Subjugation of the Tribe.—Its present condition at the Bosque Reservation.—The Apaches many distinct Bands.—Ravages of the Mogollon and other Apaches.—The Country depopulated by them.—Walapais.—Yampas.—Indians of the Colorado.

In nature, the productive and the destructive elements are everywhere found side by side, and not only is this true as an abstract principle of actual existence, but there is not a creature without natural enemies who prey upon it and live by its destruction.

Civilised man, however, although he lives by the destruction of life, animal as well as vegetable, takes care to reproduce by artificial means as much as, if not more than, he destroys; the savage, however, does not always do so, and when he does not, this is surely a proof that he is *not* destined by Providence permanently to exist.

Most conspicuous amongst the latter class are the Navajos and Apaches of New Mexico and Arizona—the hereditary enemies of the cultivator of the soil, whether he be Aztec, Mexican, or Anglo-Saxon—the savages by whose means the whole country has been nearly swept of its inhabitants, and changed from a fertile garden into a barren waste.

The Navajos, until lately, occupied a fine tract of country watered by the Colorado Chiquito, the Rio San Juan, and their tributaries, and the western branches of the Rio Grande. They were bounded on the north by the Ute

nation, on the south by the Apaches, on the west by the Moqui and Zuñi Pueblos, and on the east by the inhabitants of the Rio Grande valley. Although often placed under the head of Apaches, they are in every respect a different and a finer race. They are bold and defiant, with full lustrous eyes, and a sharp, intelligent expression of countenance; they had fixed abodes in their country, around which they raised crops almost rivalling those of the Pimas on the Gila: they carried one art—the weaving of blankets—to a state of perfection which, in closeness of texture and arrangement of colour, is scarcely excelled even by the laboured and costly seraphes of Mexico and South America. I tried at Santa Fé to purchase some, but the prices were so enormous, averaging from seventy to one hundred dollars for choice specimens, that I refrained.

For love of plunder and rapine these Indians have no equals. Their number, twenty years ago, was probably about twelve thousand, and while they left their wives and old men to plant, reap, attend to the stock, and make blankets, the braves spent their lives in traversing the whole country, carrying off the stock of the helpless Mexican farmers, and keeping the entire agricultural and mining population in a constant state of alarm. To give a slight idea of the depredations of these hordes, I may state that between August 1st, 1846, and October 1st, 1850, there were stolen by them, according to the Reports of the United States Marshals, no less than 12,887 mules, 7,050 horses, 31,581 horned cattle, and 453,293 head of sheep. The official reports from New Mexico appeared to contain nothing but catalogues of depredations committed by the Navajos, or of similar deeds done by the Apaches; and not only was the valley of the Rio Grande swept over and over again of its stock, but the Indian pueblo of Zuñi, and many

other native towns, barely escaped destruction, and this too since the annexation. How many perished previously, who can tell?

Governor Charles Bent thus spoke of them in 1846:—"The Navajos are an industrious, intelligent, and warlike race of Indians, who cultivate the soil, and raise sufficient grain and fruits of various kinds for their own consumption. They are the owners of large herds and flocks of cattle, sheep, horses, mules, and asses. It is estimated that the tribe possesses thirty thousand head of horses, mules, and asses. It is not rare for one individual to possess from five to ten thousand sheep, and four or five hundred head of other stock. Their own horses and sheep are said to be greatly superior to those reared by the Mexicans; but a large portion of their stock has been acquired by marauding expeditions against the settlements of this territory. They roam over the country, between the waters of the River San Juan on the north, and those of the Gila on the south. This country is about 150 miles wide, consisting of high table mountains, difficult of access, affording them as yet effectual protection against their enemies. Water is scarce, and difficult to be found by those not acquainted with the country, affording them another natural safeguard against invasion. Their numbers are variously estimated at from one to two thousand families, or about fourteen thousand souls. The Navajos, so far as I am informed, are the only nation on the continent, having intercourse with white men, that is increasing in numbers. They have in their possession many prisoners—men, women, and children—taken from the settlements of this territory, whom they hold and treat as slaves."

Such was their condition in 1846; since then their history has been one long series of misfortunes. As far back as any

information can be obtained about them, they have been at war with the Mexicans and white men, the system of reprisals being sytematically carried out on both sides. The Mexicans of one settlement would collect together, and make a raid on a marauding band of Navajos, capturing all they could, not only in stock, but in women and children. The Indians would retaliate, not caring particularly whether it was the aggressors or some peaceful neighbours they attacked in return. This being the state of affairs, we find even as early as the autumn of the first year of possession, that General Kearney (United States army) gave orders to Colonel A. W. Doniphan, then in California, to march against the Navajos; and to Governor Bent, advising him that "full permission should be given to the citizens of New Mexico to march in independent companies against these Indians, *for the purpose of making reprisals*, and for the recovery of property and prisoners."

From this time until 1863 war has been unceasing with this hardy tribe. Their hand has been against every one, and every one's hand has been against them; even the Pueblos left their villages and joined the whites against them; and as they had actual property in corn-fields, flocks, and herds, they could not, like their wild neighbours, the Apaches, who lived by the chase and marauding only, altogether escape from the hands of the military. It was cruel work, however necessary.

I have spoken to many who helped to *humble* the Navajos. As soon as harvest time approached, the soldiers would enter their country, year after year; they say that the corn-fields were splendid, but they cut them all down, and fired the district wherever they went, driving off sheep, sometimes to the number of seventy thousand in a single raid, and oxen also

by thousands. When there were no crops to destroy, and no apparent enemy to be found, or flocks to drive off, the military would encamp at the different springs, and try by this means to destroy the remnant of their stock; but in this, for a long time, they were unsuccessful, for the Navajo sheep, probably from force of habit, could thrive if only watered once every third or fourth day, and thus it happened that when the troops had guarded a spring long enough, as they supposed, to prove that no Indians or flocks were in that district, and had left to go to another, the Navajos, who were quietly grazing their cattle in the secluded nooks amongst the hills hard by, came down to the spring and refreshed themselves with perfect impunity.

Year after year they boldly held out, and plunder became to them a necessity of existence, for they had no other means of support. At last, however, this never-ceasing hostility reduced the whole tribe to utter destitution, nor did they give up until they were literally starving. In 1863 the first large section of them—I believe about five thousand in number—delivered themselves up to the government. They were removed from their own country, and placed upon a large reservation on the Rio Pecos, and old Fort Sumner, which had been abandoned, was re-established in the centre of the reservation, for the purpose of carrying out the design of the government towards them. Since then, nearly all the remains of the tribe have delivered themselves up, and to the number of about seven thousand five hundred have been placed on the reservation. Mr. Ward is of opinion that a very small fraction indeed of this once powerful tribe is now at large in the country north of the Rio Colorado, and in Utah Territory; but since, for years before they gave in, the advantage has been on the side of the settlers against the

Navajos, he assures me that there are at the present time not less than two thousand captives in the hands of the Mexicans, who profess to bring them up, and to take care of them as members of their families and households.

As regards the present condition of the Indians on the Bosque reservation, I cannot do better than give a short quotation from the Report of Colonel A. B. Norton (Superintendent of Indian Affairs in New Mexico) for the year 1866:—"At Fort Sumner this tribe has about two thousand five hundred acres of land under cultivation, mostly in Indian corn, with an admirable system of irrigation. The water, however, is very poor in quality, and wood so scarce, that it has to be hauled from twenty-five to thirty miles to the post, while the mezquit root, the only wood used by them for fuel, must soon give out. Add to this that the Comanches make constant raids upon them, to within a few miles of the fort, and as they are very little able to protect themselves, this adds still more to their discontent. Of the state of health and morals of these Navajos, the hospital reports give a woeful account. The tale is not half told, because they have such an aversion to the hospital that but few of those taken sick will ever go there, and so they are fast diminishing in numbers; while the births are many, the deaths are more. Discontent fills every breast of this brave and light-hearted tribe, and a piteous cry comes from all as they think of their own far-off lands, 'Carry me back, carry me back!'" They have had a severe lesson and a terrible punishment, but when a railway traverses the country, they may with perfect safety be allowed to return to their own land, now parched and desolate, but still so yearned for by these unhappy prisoners.

Without further investigation I cannot hazard an opinion as to whether the Navajos are a branch of the town-builders

or the true North American redskins. They say themselves that they are related to the former, and their arts as well as their faces would, I think, rather tend to lead us to the same conclusion. Those figured at page 147 look far more like Southern than Northern Indians, and the woodcut is a good copy of a photograph.

While the Navajos spread terror and desolation through the north and east of New Mexico, the Apaches followed the same system of plunder in the southern part of the state, and throughout Arizona and Northern Sonora; with this great difference, that amongst the former booty was their only object, and they spared life unless resistance was offered; but with the latter war to the death was, and still is, their undeviating practice. In battle the Navajo never stoops to scalp his fallen enemy, and many acts of true generosity are related of him; but the cowardly Apache creeps upon his victim like a snake in the grass; if he can capture him he invariably tortures him to death, but otherwise he scalps and mutilates him in the most horrible manner, and has never been known to show the smallest trace either of humanity or good faith.

Several independent though kindred tribes are rightly classed under the term Apaches; the following table gives their names, the localities in which they are usually encountered, and the probable population of each:—

Names.	Districts.	Populations.
Jacarrilla Apaches	Maxwell's reservation and Toas district	500
Mescalero ,,	Mountain South of Fort Stanton	525
	MOGOLLON TRIBES, COMPRISING THE	
Miembres Apaches	Miembres Mountains	400
Coyotero ,,	Sierra Blanca of Arizona	700
Pinal ,,	Pina-leño Cordillera	2,000
Tonto ,,	Between the Rio Salinas and Verde	800
Chi-ri-ca-hui ,,	Chi-ri-ca-hui Mountains	500

The first of these tribes is now quite harmless, and as its members are too few and cowardly to hold their own against the other tribes, they willingly submit to being fed and taken care of at the expense of the government. The second tribe was formerly a very warlike one, and it is chiefly owing to its ravages that the fertile valley of the Rio Grande, from San Antonio, north of Fort Craig, to La Mesilla, a distance of over one hundred miles, is now an uninhabited waste. War, disease, and scarcity of food have of late years so thinned their ranks, that the government succeeded a short time ago in collecting them together and placing them on the Bosque reservation with the Navajos. As these tribes were sworn enemies, they did not long live together, for on the night of November 3rd, 1866, the Apaches deserted, and have since that time been committing depredations on the government stock, and murdering and plundering the settlers so far north as Los Vegas and Galistro. We heard much of their ravages while passing through that district.

All the Mogollon bands are still at large. They mostly inhabit the vast region formed of lofty table-lands and mountain ranges in which the head-waters of the Rio Gila rise; and from these fastnesses, still unexplored, they have for ages been making raids upon their more civilised neighbours on all sides of them.

Some of the depredations of the Miembres Apaches, under their chief, Mangos Colorados, will be found in the second chapter of Part III.

A very characteristic tragedy was perpetrated at Fort Bowie while I was there, by Cachees' band of Chi-ri-ca-hui Apaches. This occurrence is related also in Part III., chap. iii.

It is only necessary here to say a few words about the

remaining sub-tribes—the Coyoteros, Pinals, and Tontos. Very little is known about themselves, far too much about their ravages. Their numbers are very variously estimated, but the general belief is that they are not numerous. They occupy the centre of the Apache country, and the few attempts as yet made to "clear them out" have resulted in complete failure. The commander at Camp Grant told me that two years ago he made a raid into their country, but before he had gone many miles he found that his enemies were gathering around him in such numbers that his small force of fifty soldiers had to beat a rapid retreat. One of our parties had a terrible fight with the Tonto Apaches in Northern Arizona. An account of it will be found in chap. xi., vol. ii.

The favourite field for plunder during the last century has been Northern Sonora. The Apaches seem never to have lived there, but their custom was to descend in bands along the whole length of the Pina-leño and Chi-ri-ca-hui Mountains, which, so to speak, form a bridge two hundred miles long across the Madre Plateau from the mountains north of the Rio Gila to the Sierra Madre of Mexico.

The Spaniards protected their outlying provinces from these hordes by a complete system of military posts from San Antonio, in Texas, to the Pacific. These were, along the Rio Grande, the Presidio del Rio Grande, San Carlos, Presidio del Norte, and San Eleazario; across the State of Chihuahua, Carrizal, Cayome, Galeana, and Janos; and across Northern Sonora followed, in close succession, the Presidios of Babispe, Fronteras, Bacuachi, Santa Cruz, and Tubac, reaching to the outskirts of Papago country and the Sonora desert. Thus the Spanish miners and rancheros were protected, and the country south of these limits became rich in flocks, herds, and

productive mines, while the population increased with great rapidity. But as the power of Spain declined, and the central government at the city of Mexico degenerated into a chaos of contending factions, the troops which garrisoned these frontier stations were gradually withdrawn; the grand military system, which had so effectually done its work, was allowed to fall into decay, and most of the presidios were relinquished altogether.

The Apaches were not long in discovering the weakness of their wealthy neighbours, and year by year their raids became more numerous, and their ravages more destructive. At first the stock of the outlying rancheros fell a prey to the enemy, and, although probably but a small proportion of the vast herds which formerly occupied the rich grazing regions of North-eastern Sonora and Northern Chihuahua were really carried off by the red men, the rancheros had to fly for their lives, and leave their cattle to their fate. This accounts for the herds of wild cattle and horses which are still to be found in those districts. Then the miners began to be molested, their stock, chiefly mules, driven off, and they themselves so terrified that they could not be induced to remain. When the country districts were cleared, the little towns next formed the chief objects for attack. The Apaches would lie concealed for days, until an opportune moment had arrived for capturing the cattle and plundering the place. The people at last became so terrified, that if they heard of a band of Apaches fifty miles off, they very frequently left everything and fled. Against such an enemy they were almost powerless, for the mountain fastnesses from which he came lay far away to the north, and anything approaching an open fight was always avoided by him.

This state of things, in fine, going on year after year, has

entirely depopulated that country. Its ruin was almost complete before the Treaty of 1854 had finally settled the question of boundary line between Mexico and the United States; but one of the chief stipulations of the treaty was that the latter government should keep the Apaches in their own country, and prevent them from making any more raids into Mexican territory. Although this was promised, it could not be accomplished; for the United States military have, up to the present time, been almost powerless in their attempts either to "wipe out" or to restrain these marauding hordes. They have, as we shall see in many of the incidents to be related, neither protected their own subjects on their own soil, nor sheltered the helpless Mexicans across the border.

But the Apaches do not lay waste Northern Sonora as they formerly did, chiefly because there is now nothing to plunder; all is desolation. Destiny, however, seems to be doing what the government has failed to do; it is destroying the Apache nation. Although very few are yearly killed in fight, and the white man has not as yet penetrated into the heart of their country, still they are dying out fast; already the total population, as far as it can be estimated, is so small as to appear at first to be beneath our notice; but the scalp of many a brave settler will yet be taken before these blood-thirsty savages are crushed.

In the region lying between the Rio Verde, which is about the limit of the Apache country, and the Rio Colorado, two tribes, few in number, and of the lowest type of humanity, are met with. These are the Walapais (Hualpais) and the Yampas. The latter chiefly inhabit little strips of marshy land at the bottom of the deep cañons, which debouch upon the Colorado Cañon. Both tribes were encountered by our parties about the 35th parallel; they are comparatively

harmless, and much resemble the Pai-utes of the Great Basin. The valleys of the Colorado, from the end of the Black Cañon almost to the head of the gulf, are inhabited by Indian tribes who occupy an intermediate position between the semi-civilised Pueblo Indians and the wild Apache races.

They have for some time kept peace with the whites, but contact with them appears to be rapidly hastening their extinction. As there is no special interest attaching to these

Mojave Indians.

savages I will leave the accompanying woodcut, copied from a photograph taken at Fort Mojave, to speak for itself. The Mojaves are the largest tribe, and once numbered ten thousand souls.

CHAPTER III.

THE AZTEC RUINS OF NEW MEXICO AND ARIZONA.

The Ruins may be divided into three classes:—*Ruins on the Rio Grande Valley:* Ruins of Pecos, Quarra, Gran Quivera, and Abo. *Ruins on the Southern Tributaries of the San Juan River:* Pintado, Una Vida, Wegigi, Chetho Kette, Hungo Pavie, and Bonito. *Ruins on the Colorado Chiquito and Tributaries:* Ruins near Zuñi, north-west of the Moquis, Pueblo Creek, &c.; Ruins on the northern branches of the Rio Gila, on the Salinas, Rio Verde, San Carlos, &c.; in the Gila Valley, and on the Streams south of it; Casa Montezuma and Casas Grandes; lastly, Casas Grandes and Casa Janos, in Chihuahua.

I MUST now say a few words about the ruins which are to be found scattered throughout New Mexico, Arizona, and Northern Mexico. There is scarcely a valley in the Rio Grande basin in which the stone or adobe foundations of villages are not to be found; there is scarcely a spring, a laguna, or a marsh upon the plateau which is not overlooked by some ruined fortress. Usually these relics crowned a commanding eminence, not always in close proximity either to the fertile land which supported the community, or even to the spring which supplied them with water. If a stream runs near them, the remains of acequias, or irrigating canals, are generally to be found. There are many places, however, where cultivation had been successfully carried on without them, the rainfall alone being relied upon; while some ruins show signs of reservoirs and terraces similar to those still in use amongst the Moquis.

The ruins may be classed under three heads:—

1st. Ruins of many-storied Indian strongholds.

2nd. Ruins of buildings evidently constructed under Spanish rule.

3rd. Ruins, the foundations of which alone remain.

East of the Rio Grande, there are at least four ruined towns of the first order deserving of special notice: these are the ruins of Pecos, Quarra, Gran Quivera, and Abo; all, however, contain ruins of Spanish as well as Indian origin. The early Spaniards tell us that Pecos was a fortified town of several stories. It was built upon the summit of a mesa which jutted out into the valley of the stream of the same name, and overlooked the lowlands for many miles in both directions. The only conspicuous buildings now to be seen amongst the ruins are the Spanish church and the Mexican temple. For probably a century the two religions flourished side by side; the incense ascended from the altar of the one, and the fire of Montezuma burned day and night in the estufa of the other. The church is a cruciform adobe structure, the greater part of the walls of which are still standing. Montezuma's church, the ruins of which are almost continuous with those of its rival, is much more decayed; it shows signs of having been at least three stories in height, and in the centre the large circular estufa is quite perfect.

The pueblo was called by the early Spaniards "Tiguex," and was the chief town of a district known by the same name. According to Indian tradition, it was built by Montezuma himself on his way southward from Toas; he placed his sacred fire in the estufa, and warned his people that death would come upon them if they allowed it to go out. Before leaving them he took a tall tree and planted it in an inverted position, saying that when he should disappear a foreign race would rule over his people, and there would be no rain. "They were not to lose heart, however, under the foreign yoke, nor

to let the fire burn out in the estufa, for when the time came in which the tree should fall, men with pale faces would pour into the land from the east and overthrow their oppressors, and he himself would return to build up his kingdom; the earth would again become fertile, and the mountains yield abundance of silver and gold. Then Montezuma departed and travelled southward, spreading pueblos far and wide, until he reached the city of Mexico, where he lived until the enemy, in the form of the Spaniards, arrived, when he disappeared." The Pueblo Indians say that Montezuma's prophecy has been literally fulfilled. Soon after Montezuma returned to the Great Spirit, the enemy, in the form of Spaniards, came, conquered, and enslaved them. Although they could not shake off the oppressors, still they kept the holy fire burning, and tried to dwell in peace with all men.* The Spaniards added many buildings to the town, and lived there amongst them until about the middle of the last century, when the wild Indians of the mountains attacked and desolated Pecos, driving away and murdering its inhabitants. Nevertheless, amidst the havoc and plunder of the place, a faithful few amongst the Indians managed to keep the fire burning in the estufa, until at last the deliverers with "pale faces poured in from the east," and the tree at Pecos fell to the ground as the American army entered Santa Fé. Then the little remnant of the tribe, which in 1808 only numbered 135 souls, left the ruined fortress and brought the sacred fire with them to the pueblo of Jemez, to which place their companions had migrated years before. Here they were kindly received by the Indians of that pueblo, who helped them to build acequias

* "A Mr. Vaughan, who lived near Pecos, at Tagique, for twenty years before the Americans entered the country, told Lieutenant Abbot that he had seen the sacred fire."—Senate document, No. 41. Appendix vi.

and houses, and to sow and gather in their crops; droughts no longer desolate the land, but, year after year, copious showers still bring wealth and happiness to the chosen people of the Great Prince.

I passed Pecos on my way to Santa Fé. Mr. Eicholtz's party saw the ruins of Quarra and Abo, on their journey through Abo Pass, and left the Gran Quivera a few miles to the eastward; for these three pueblos lie within a radius of ten miles.

The ruins of Quarra consist, like those of Pecos, of a church, a large Aztec building, which was probably several stories high, although now a heap of stones and rubbish, and numerous foundations of smaller houses, probably of Spanish or Mexican origin. The church is built of red sandstone, in the form of a cross; the length of nave and chancel is 140 feet, that of the transept is 50; the widths respectively are 33 to 18 feet; the walls are but 2 feet thick and 60 feet high.

At Abo there is also a ruined church, cruciform in shape, the arms being respectively 27 and 129 feet; it is built of small, beautifully-cut stones, placed together with the utmost nicety. Other extensive ruins are scattered around it.

At Gran Quivera there are extensive ruins of Spanish buildings, having upon them the arms of different families; but there are other ruins undoubtedly of Indian origin, which fully carry out the statement of the historian Venegas and others, that this ancient pueblo was a large fortress, consisting of seven terraces, rising in steps one from the other. The remains of large acequias are to be seen in the vicinity both of Gran Quivera and Quarra. So much for the ruins of the Rio Grande basin.

There are not, to my knowledge, any ruined pueblos as far

north as the main valley of the Rio San Juan, but there are several upon the two most southern tributaries—the Rio de Chelly and the Cañon de Chaco. The most remarkable are the pueblos Pintado, Una Vida, Wegigi, Hungo Pavie, and Bonito, all on the latter stream. Besides these there are five others in a more ruined state. The Pueblo Pintado has three stories, its whole elevation being about 30 feet. The walls are built of small flat slabs of grey, fine-grained sandstone, $2\frac{1}{2}$ inches thick, and are put together with much art and ingenuity by means of a kind of mortar made without lime. At a distance they have the appearance of mosaic work. The thickness of the outer wall of the first story is 1 yard at the base, diminishing at each successive story, until the top wall scarcely exceeds 1 foot. There are, as usual, no external openings in the ground floor. The length of the edifice is 390 feet; the ground floor contains fifty-three rooms, which open into each other by means of very small doors, in many instances only 33 inches square. The floors are made of rough beams, over which transverse cross-beams are laid, and above all is a coating of bark and brushwood covered over with mortar. The wood appears to have been cut with some blunt instrument.

The ruins of Wegigi are similar to those of Pintado, being 690 feet in length, and having ninety-nine rooms on the ground floor. The Pueblo Una Vida is no less than 984 feet long, and the Pueblo Bonito is still more extensive. The estufa of the latter is very large, and in a fair state of preservation. It is 180 feet in circumference, and the walls are regularly formed of alternate layers of small and large stones, held together with mortar.

Another pueblo, Chetho Kette, measures 1,300 feet in circumference, and was originally four stories high. It has the

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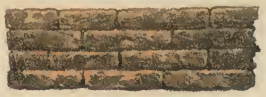
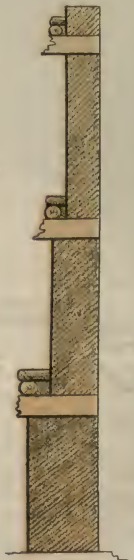
RESTORATION OF THE PUEBLO HUNGO PAVIE.





Vincent Brooks Day & Son, Lith.

remains of one hundred and twenty-four rooms on the first story. The most perfect of the ten ruined pueblos discovered by Lieut. Simpson in the Cañon de Chaco is that of Hungo Pavie (or the Crooked Nose). Its circumference, including the enclosed court, is 872 feet. It faces, as usual, the cardinal points, and contains one estufa, placed in the centre of the northern wing of the building.

The accompanying engravings are taken from Simpson's "Navajo Expedition," and show at a glance the form of these structures. The terraces of Hungo Pavie are here represented as facing the central court. This may have been the plan adopted in many pueblos, but not in all. At Zuñi, for instance, the terraces face outwards and rise in steps towards the centre, and while the ruins in the Cañon de Chaco seem to show that there the outermost wall was the highest, many ruins elsewhere prove that the opposite was often the case. Thus two forms were probably in use: the one rose from without in steps towards the centre of the building, the other faced the courtyard, and was encircled by its highest wall.

One or more estufas have been discovered in each pueblo. Some are rectangular; others circular. There are similar ruins in the Valle de Chelly. The Navajo Indians, in whose country these pueblos are situated, say, I am told, that they were built by Montezuma and his people at the time of their emigration from north to south, and shortly before their dispersion on the banks of the Rio Grande, and over other parts of Mexico.

The country occupying the fork between the Great Colorado and the Colorado Chiquito forms a part of that vast tableland, the Colorado Plateau, through which both these streams pass in deep cañons.

The land is deeply eroded, being cut up into lofty mesas of variable size, and is very arid and worthless. The seven Moqui villages crest the edges of some of the mesas which form the south-eastern escarpment of the Colorado Plateau. Further to the north-west, and nearer the Colorado, there is another group of peublos in ruins, larger than those of the Moqui Indians, but situated, like them, on the flat summits of mesas, containing estufas, reservoirs, terraces, aqueducts, and walls of at least four stories high. No trace has as yet been found of their former inhabitants.

Next we come to the ruins on the Colorado Chiquito and its southern tributaries. There are ruins upon El Moro, ruins north of Zuñi, Old Zuñi, and others along the Zuñi River; ruins, also, on the Rio Puerco of the West, amongst which our parties found abundance of pottery; and there are most extensive ruins in the main valley, both above the falls and between the falls and the entrance of the cañon of the Chiquito, scattered along a fertile basin of at least a hundred miles in length. At Pueblo Creek the remains of several fortified pueblos were found, crowning the heights which command Aztec Pass; but west of this point (longitude 113° west) no other ruins have as yet been discovered.

Leaving the basin of the Colorado Chiquito, we pass southward to that of the Rio Gila, where the most extensive ruins of all are to be found. Some fine streams enter this river on the north, draining a country very little known, but of great interest, and containing many fertile valleys. The chief of these tributaries are the Rios Preito, Bonito, San Carlos, Salinas, and Rio Verde, which latter two unite before joining the Gila, twelve miles from the Pima villages, and lastly, the Agua Fia. The great New Mexican guide, Leroux, started northward from the Pima villages in May, 1854, crossed over

to the junction of the Salinas with the Rio Verde (also called Rio de San Francisco), ascended the latter stream, and crossed from it to the 35th parallel route along the Colorado Chiquito. He represents the Rio Verde as a fine large stream, in some places rapid and deep; in others, spreading out into wide lagoons. The ascent was by gradual steppes, stretching out on either side into plains which abounded in timber—pine, oak, ash, walnut, sycamore, and cotton-wood. The river banks were covered with ruins of stone houses and regular fortifications, which were evidently the work of a very civilised race, but did not appear to have been inhabited for centuries. They were built on the most fertile tracts of the valley, where were signs of acequias and of cultivation. The walls were of solid masonry, of rectangular form, some twenty or thirty paces in length, and from 10 to 15 feet in height. They were usually of two stories, with small apertures or loopholes for defence when besieged, and reminded him strongly of the Moqui pueblos. The large stones of which these structures were built must often have been transported from a great distance. At one place he encountered a well-built fortified town, ten miles distant from the nearest water.

Other travellers and prospectors report many ruined pueblos along the Salinas, others on the San Carlos, and several very extensive ones in the fertile Tonto basin, which is drained by a tributary of the Salinas. Of many of the ruins on the Gila itself, and in the valleys of its southern tributaries, I can speak from personal knowledge. A little west of the northern extremity of the Burro Mountains, the Rio Gila leaves the Santa Rita and other ranges, and meanders for a distance of from seventy to one hundred miles through an open valley of considerable width. This long strip of fertile bottom-land is studded throughout with deserted pueblos, which, at the

present time, belong almost entirely to the third class—viz., those of which the foundations alone mark the localities. It is impossible to travel more than a mile or two along the margin of the lowlands without encountering them, and one of our guides, who knew the ground well, told me that at least one hundred thousand people must at one time have occupied this valley. The ruins follow the river quite to the mouth of the first cañon by which the Gila cuts through the Pina-leño Mountains.

In the cañada of the Aravaypa, on the western side of this range, I examined the ruins of two pueblos, one being a fortification covering the top of a steep hill which guarded the entrance to the Aravaypa Cañon. All along the San Pedro valley, through which Mr. Runk's party travelled for 160 miles, ruined pueblos were frequently met with. Amongst them the remains of pottery, such as is generally used by the town Indians and Mexicans, were picked up in great abundance. Remains of acequias also were very numerous. Between Camp Grant, where I left my party to enter Old Mexico, and the Pima villages, the mesas bordering on the Gila are pretty thickly studded with ruins, but further west than the confluence of the Rio Verde no more traces of pueblos are to be found.

Two good-sized ruins are situated near the Pima villages; one is known as Casa Montezuma, the other as Casa Grande. Casa Montezuma, also called Casa Blanca, consists of the remains of four large houses, one of which is tolerably perfect as a ruin. Around it are piles of earth showing where others had been, and although ten miles distant from the river, all the intervening space is intersected by acequias, and was no doubt once under cultivation. The chief ruin is four stories high, and 40 feet by 50 wide; the walls face the cardinal

points, and there are four estufas 4 feet by 2 in size. The rafters inside were almost entirely destroyed by fire, but as far as could be seen they had been very roughly hewn. The walls consisted of brick, mortar, and pebbles, smoothed without and plastered within. The arrangements of the rooms, the presence of doors, and the absence of terraces would lead one not to attribute this building to Aztec origin. The Pimas, however, account for it thus:—Long ago a woman of exquisite beauty ruled over the valleys and the region south of them. Many suitors came from far to woo her, and brought presents innumerable of corn, skins, and cattle to lay at her feet. Her virtue and determination to continue unmarried remained alike unshaken, and her store of worldly possessions so greatly increased, that when drought and desolation came upon her land, she fed her people out of her great abundance, and did not miss it, there was so much left. One night, as she lay asleep, her garment was blown from off her breast, and a dew-drop from the Great Spirit fell upon her bosom, entered her blood, and caused her to conceive. In time she bore a son, who was none other than Montezuma, and who built the large casas and all the other ruins which are scattered through the land.

After instructing his people in the arts of civilisation he departed for the South, and then disappeared.

Casa Grande is situated a little below the junction of the Rio Verde and the Salinas. It is a rectangular ruin, 220 feet by 68 feet, whose sides face the cardinal points. The highest walls are, as usual, to be found in the centre of the pile, and they appear to have been three or four stories high.

Besides abundance of broken pottery, we found sea-shells, often pierced and otherwise converted into ornaments, about

the ruins which skirt the Gila and neighbouring streams, showing that these people must have had some intercourse with tribes living along the coast. These shells may have been brought by tribes inhabiting the Lower Colorado across the Sonora Desert, to exchange for food, clothing, and other Pima manufactures; but I think it most probable that the kindred race, the Papagos, were the chief venders of shells, for they are great traders, and wander through all Northern Sonora, from the Gulf of California to the Sierra Madre, and even now supply the scanty population of this region with sea-salt obtained from some salt lakes near the coast.

The Pimas themselves state positively that at one time they were a great and powerful nation, living in houses similar to the ruins found on the Gila; but after the destruction of their kingdom they travelled southward, settled in the valley where they now dwell, and, fearing lest they should again become an object of envy to a future enemy, were content ever afterwards to live in huts.

Lastly, I would mention one more cluster of ruins which, although they lie south of the boundary line of the United States, belong without doubt to the same class as those I have been considering; these are the Casas Grandes and Casa de Janos, situated on the Rio Casas Grandes, which flows northward into the Laguna de Guzman in North-western Chihuahua. The former, according to the historian Clavegero, is similar in every respect to the ruined fortresses of New Mexico, consisting of three floors, with a terrace above them, and without any entrance to the ground floor. The doors led into the buildings on the second floor, so that scaling ladders were necessary. A canal, says Dr. Wislizenus, conveyed water from a spring to this place. A watch-tower, probably Casa Janos, stands two leagues to the south-west of it, commanding a wide extent of country, and along the

stream are many mounds in which have been found earthen vessels, painted white, blue, and violet; also weapons of stone, but none of iron. The following particulars are from Bartlett's personal narrative:—"The ruins of Casas Grandes face the cardinal points, and consist of fallen and erect walls, the latter varying in height from 5 to 30 feet, projecting above the heaps of ruins which have crumbled to decay. Were the height estimated from the foundations, it would be much greater, particularly of those of the centre part of the building, where the fallen walls and rubbish form a mound 20 feet above the ground. If, therefore, the highest walls now standing have their foundations on the lowest level, their probable height was from 40 to 50 feet. I conclude that the outer portions of the building were the lowest, about one story high, while the central ones, judging from the height of the walls now standing, and the accumulation of rubbish, were probably from three to six stories. Every portion of the building is made of adobe, which differs from that now made by the Mexicans in that the blocks are very much larger, being 14 or 16 inches long, 12 inches wide, and 3 or 4 thick; the others are usually 22 inches in thickness, and 3 feet or more in length. Gravel was mixed with these large adobes, which greatly increased their hardness, but no straw was used. The building consists of three masses, united by walls, of probably but one story, forming perhaps only courtyards; they are now weather-beaten down to long lines of mounds.

"The entire edifice extends from north to south 800 feet, and from east to west 250. The general character is very similar to Casas Grandes near the Pima villages and the ruins on the Salinas. Not a fragment of wood remains; many doorways are to be seen, but the lintels have gone, and the top has in most cases crumbled away and fallen in.

"Some of the apartments arranged along the main walls are 20 feet by 10, and connected by doorways, with a small enclosure or pen in one corner, between 3 and 4 feet high. Besides these there are many other exceedingly narrow apartments, too contracted for dwelling-places or sleeping-rooms, with connecting doorways, and into which the light was admitted by circular apertures in the upper part of the wall. There are also large halls, and some enclosures within the walls are so extensive that they could never have been covered with a roof. The lesser ranges of buildings which surrounded the principal one may have been occupied by the people at large, whose property was deposited within the great building for safe keeping. Although there appears to be less order in the *tout ensemble* of this great collection of buildings than in those further north, the number of small apartments, the several stages or stories, the inner courts, and some of the minor details, resemble in many respects the large edifices of the semi-civilised Indians of New Mexico."

The builders showed much sagacity in their choice of so fine a region for agricultural purposes. There is none equal to it from the lowlands of Texas, near San Antonio, to the fertile valleys of California, near Los Angelos; and with the exception of the Rio Grande, there is not one valley equal in size to that of the Casas Grandes, between those of Eastern Texas and the Colorado of the West. The water of the Rio Casas Grandes, unlike that of the Rio Grande, Pecos, and Colorado, is clear, sweet, and sparkling. Not more than one hundred yards' distance is another ruin, about 15 feet square. Garcia Conde says that these edifices were known to have had three stories and a roof, with steps outside, probably of wood. Healos repeats the story of the Aztec

emigration, and states that this was the third stopping-place of that people on their way from the North to the city of Mexico.

I met with no Indian ruins in Sonora, nor have I heard of any other similar ones either there or in Chihuahua.

Let us now try to discover, from the writings of a few of the earliest Spanish explorers, what kind of people they found on their discovery of the country. I think I have said enough about the small remnant of civilised Indians still remaining, and of their natural enemies, the wild and untamable savages, to prove what a striking difference exists between them. I have also probably given a longer catalogue of ruins than the patience of my reader has been able to bear. The question, however, of the greatest interest still remains to be answered—viz., Who were the builders of these ruins, and why have they disappeared? The early Spaniards throw considerable light upon this question; and I think, after hearing what they have to say, we may draw a fair conclusion for ourselves. I have neither had time nor opportunity to make researches amongst the long-forgotten archives of Spain or Mexico; but Lieutenant A. W. Whipple has discovered in Colonel Peter Force's extensive library, at Washington, some very interesting matter; a little more material has been added from other sources, and I collected many additional facts at Santa Fé during my fortnight's visit there. I may also add that the second, third, and fourth letters of Fernando Cortez to the Emperor Charles V. were translated in America by George Tolson (New York, 1843, 8vo.), and that the fifth letter has just appeared in the "Journal of the Hakluyt Society," by Don Pascual de Gayangos (1868). The first letter has not been translated, because its authenticity is still doubted.

CHAPTER IV.

NEW MEXICO WHEN DISCOVERED BY THE SPANIARDS.

Expeditions of Joseph de Basçonzales, A.D. 1526; of Pamphilo Narvaez and Cabeza de Vaça, A.D. 1527 to 1538; of Friar Marco de Niça, A.D. 1539; of Francisco Vasques de Coronado, Fernando Alarçon, Melchior Diaz, and Garci Lopez de Cardenas, A.D. 1540.—The Rio Colorado discovered by three explorers in the same year, one of whom describes the Great Cañon. —Expedition of Antonio de Espejo.

It is the fashion nowadays to sneer at any undertaking carried out for an *idea*. If some solid advantage cannot be demonstrated mathematically, we are told that it is useless to urge this practical generation to a needless expenditure of energy, capital, or muscle. We now know that the philosopher's stone is a myth, but we are apt to forget that chemistry owes its origin to the labours expended in trying to discover it. No civilised nation would dream in this the nineteenth century of upholding at the point of the sword any peculiar set of religious dogmas; yet what force has been more potent all over the world; what influence has determined the fate of greater nations, or swept bare and repopulated vaster regions with alien races, than that of religious fanaticism? But is it really true that we have become so material, so un-idealistic, that we can no longer be stimulated to great deeds by the force of moral influence alone,—that no belief has sufficient hold upon us to make us leave the farm or the workshop, and willingly buckle on the sword to fight in its defence? Emphatically, no! The most

destructive war of modern times was as absolutely fought for an idea as the wars of the Crusaders and the siege of Troy.

Until the moral conviction that slavery was a curse to the Anglo-Saxon race had taken deep root in the hearts of the American Republicans there was slight chance indeed of their crushing the Southern Confederacy; but when the masses in the North were thoroughly roused, and invited to sell their lives for an idea pure and noble in itself and worthy of any sacrifice, the best men from all sides rushed into the ranks, bringing such new life and fixed determination with them, that the ultimate fate of the Confederacy was no longer doubtful. Since, then, the present is not, after all, so very unlike the past—especially in the springs of action which lead to the greatest events—we can share the feelings of the early Spaniards when they performed feats of almost superhuman strength and daring in their efforts to wrest their ideal El Dorado from the pagan world.

Early in the spring of 1526—ninety-four years before the landing of the Pilgrim Fathers in New England, and thirty-four years after the shores of St. Salvador delighted the eyes of Columbus—Don Joseph de Basçonzales crossed the centre of Arizona towards the Great Cañon, and penetrated at least as far as Zuñi. No record remains of this, the first expedition into that country, but the bare memento of the fact carved on the side of "El Moro;" for none of the expedition ever returned to tell of their adventures. They perished either by the hands of the Indians, or met a more miserable end amongst the labyrinths of chasms still further north, across which nought living but the birds can successfully pass.

Those who remember the wonderful achievements of Cortez in Mexico may call to mind one Pamphilo Narvaez, who in 1520 was despatched by Velasquez, Governor of Cuba, with a

detachment to arrest Cortez in the midst of his victories, and to deprive him of authority. Cortez was then in the city of Mexico, beset with many and appalling difficulties. Nevertheless, he marched at once with a few trusted comrades towards the coast, attacked Narvaez with one furious onslaught, overcame him, and took his whole detachment prisoners. "Esteem it great good fortune," said Narvaez, "that you have taken me captive." Cortez disdainfully replied, "It is the least of the things that I have done in Mexico." This was the Narvaez who afterwards obtained from Charles V. the right to make extensive conquests and explorations north of the Gulf of Mexico.

In the winter of 1527-28 he fitted out an expedition, consisting of four hundred men, eighty horses, and five ships, left San Domingo, and, after a prosperous voyage, reached the coast of Florida about the middle of April. There, while carrying on explorations in the interior, he was deserted by his squadron, and obliged to put out to sea in five rude boats made by his famished soldiers. His usual bad fortune, however, followed him; he was wrecked on one of the islands at the mouth of the Mississippi, and perished with all his companions save three: these were Cabeza de Vaça, treasurer and second in command; Esteva Dorantes, an Arabian negro; and Castillo Madonado. Vaça was a man of letters, and of great strength of character, and boldly determined at all hazards to advance into the unknown regions before him, and strike, if possible, the Pacific coast. He was taken prisoner, however, by the wild Indians of Southern Texas, and remained a captive for six years. After that time the three adventurers made their escape, and after travelling for twenty months in a north-westerly direction, amongst hostile tribes and over arid deserts, they struck the

Canadian River. This they followed in a westerly direction, and passed over the dividing ridges into the valley of the Rio Grande. After wandering from pueblo to pueblo, they at last made their way, in the month of May, 1538, to the village of San Miguel, in Sonora, scarcely sixty leagues from the Pacific coast, and finally reached the city of Mexico. Vaça returned next year to Spain, and laid before the King a thrilling narrative of his adventures. His description of the large towns with lofty houses containing many stories, which he had heard of in the Rio Grande valley, of the civilised Indians who cultivated maize and adorned themselves with precious stones, and of the mineral wealth which he had discovered, soon led to the organisation of a fresh expedition.

On the 7th March, 1539, Friar Marco de Niça started from the town of San Miguel, in the province of Culiacan (Sinaloa), on his journey northward, according to instructions received from Don Antonio de Mendoça, Viceroy of New Spain. His companion was Friar Honoratus, and he carried with him a negro named Stephen, and certain Indians of the town of Cuchillo, whom the Viceroy had made free. He proceeded to Petatlan, where he rested three days, and left his companion, Honoratus, sick. Thence, "following as the Holy Ghost did lead," he travelled twenty-five or thirty leagues, seeing nothing worthy of notice, saving certain Indians from "the Island of Saint Iago," where Fernando Cortez of the Valley had been. From these he learned that among the islands were "great stores of pearls."* Continuing through a desert of four days' journey, accompanied by the Indians of the islands and of the mountains through which he passed, he found other Indians,

* These were probably Yaqui Indians, who still visit the Pearl Islands along the opposite shore (Lower California), in order to carry on their occupation of diving for pearls. They are great travellers, and would therefore be valuable guides.

who marvelled to see him, having no knowledge of any Christians, or even of the Indians from whom they were separated by the desert. They entertained him kindly, and called him "Hayota," in their language signifying a man come from heaven.* He was told by these people, whom Vasquez Coronado had named Coraçones, that four or five days' journey within the country, at the foot of the mountains, "there was a large and mighty plain, wherein were many great towns, and people clad in cotton." And when he showed them certain minerals which he carried, "they took the mineral of gold," and told him "that thereof were vessels among the people of that plain, and that they carried certain round green stones hanging at their nostrils and at their ears, and that they had certain thin plates of gold wherewith they scrape off their sweat, and that the walls of their temples are covered therewith." But as this valley (previously called a plain) was distant from the sea-coast, he deferred the "discovery thereof" until his return.†

Marco de Niça travelled three days through towns inhabited by the people of the Coraçones, and then came to a "town of reasonable bigness,"‡ called Vacupa, forty leagues distant from the sea. The people of Vacupa, he states, showed him "great courtesies," and gave him "great store of good victuals, because the soil is very fruitful, and may be watered." Here the negro, Stephen, was sent in advance to reconnoitre. At the end of four days Father Marco received a message from

* These were Opita Indians, occupying the valley either of the Rio Sonora or its main tributary, the Rio de San Miguel. They received me as hospitably as they did Father Marco, and are the best-looking Indians I have ever seen. For a description of the desert, which I also traversed, see Chapter vii., Part III.

† These "great towns" were probably situated in the Casas Grandes valley (a description of some of the ruins of which has been given), and, no doubt, were famous cities amongst the Indian tribes.

‡ "Magdalena, on the Rio de San Miguel."—(*Whipple.*)

Stephen, stating that wonderful accounts had been told him of a great city, called Cevola, thirty days' journey distant. The negro pushed on without waiting as he was ordered, and succeeded in making the discovery of that people, who finally killed him.

Upon the same day that Niça received these messages from Stephen, there came to him three Indians of those whom he called Pintados, because he saw their faces, breasts, and arms painted. "These dwell further up into the country, towards the east, and some of them border upon the seven cities."* With these Pintados he departed from Vacupa upon Easter Tuesday; and having travelled three days northward, the way that Stephen had gone before him, he was informed that a man might travel in thirty days to the city of Cevola, which is the first of the seven. He was told also that, besides the seven cities, there were three other kingdoms, called Marata, Acus, and Totonteac. He asked of these Indians why they travelled to Cevola, so far from their houses. They said that they went for turquoises, ox-hides, and other things, which they received in payment for labour in tilling the ground.† They described the dress of the inhabitants of Cevola to be "a gown of cotton down to the foot, with a button at the neck, and a long string hanging down at the same; and that the sleeves of these gowns are as broad beneath as above."‡ They gird themselves with girdles of turquoises,§ and besides these, "some wear good apparel; others, hides of kine,‖ very well dressed." The

* Without doubt these were Papagos.

† A strong proof that they were Papagos, and not Pimas, or any other tribe.

‡ "This description is simply that of a Pima cotton blanket, thrown over the shoulders and pinned by a wooden button at the neck. The natural folds of this garment would produce 'sleeves as broad beneath as above.'"—(*Whipple.*)

§ Probably Pima or Zuñi belts, ornamented with green stones.

‖ Buckskin or buffalo robes.

Pintados carried certain sick folk to see him, that he might heal them, and the invalids sought to touch his garments for that purpose.

He continued his journey five days, always finding inhabited places, great hospitality, and many "turquoises" and ox-hides. He then understood that after two days' journey he would find a desert where there was no food. Before he reached this desert, he arrived at a very pleasant town, by reason of great stores of water conveyed thither to water the same.* Here he met with many people, both men and women, clothed in cotton, and some covered with ox-hides, "which generally they take for better apparel than that of cotton."† "All the people of this village," he states, "go in *caconados*—that is to say, with turquoises hanging at their nostril and ears, which turquoises they call *cacona*."‡

The "lord of this village" and others visited him, "apparelled in cotton," "in caconados," and each with a collar of turquoises about his neck. They gave him conies, quails, maize, and nuts of pine trees, and offered turquoises, dressed ox-hides, and fair vessels to drink in, which he declined. They informed him that in Totonteac was a great quantity of woollen cloth, such as he himself wore, made from the fleeces of wild beasts. These beasts they told him were about the same size as two spaniels which Stephen carried with him.

The next day he entered the desert, and when he was to dine, he found bowers made and victuals in abundance by a

* This was probably St. Xavier del Bac, situated in a rich and fertile valley, watered by acequias from the Santa Cruz River.

† If allowed for "ox-hides" to read *buckskin*, the account will apply to the Papagos and Pimas of the present day.

‡ It is usual for all the principal Indian chiefs of the Gila and Colorado, as well as those of Zuñi, to wear blue stones pendent from the nose.

river side.* Thus the Indians provided for him during four days that the "wilderness" continued. He then entered a valley,† very well inhabited with people, who were dressed also in cotton robes, with turquoises pendent from their ears and nostrils, and numerous strings of the same encircling their necks.

Through this valley, which was inhabited by "a goodly people," he travelled five days' journey.‡ The country was "well watered and like a garden," "abounding in victuals," "sufficient to feed about three thousand horsemen." The boroughs and towns were from a quarter to half a league long. Here he found a man born in Cevola (Zuñi), having escaped from the governor or lieutenant of the same; "for the lord of the seven cities liveth and abideth in one of these towns called Ahacus (Acoma), and in the rest he appointeth lieutenants under him. This townsman of Cevola is a *white man*,§ of good complexion, somewhat well in years, and of far greater capacity than the inhabitants of this valley, or those left behind." Friar Marco thus describes Cevola *from report*:— "It is a great city, inhabited by a great store of people, and having many streets and market-places; in some parts of this city there are certain very great houses, of five stories high, wherein the chief of the city assemble themselves at certain

* This "river in the desert" is probably the stream which at times flows from the Cañada del Oro, receiving all the western drainage of the Santa Catarina Mountains, and, like the Rio Santa Cruz, becomes lost in the desert.

† This was the valley of the Rio Gila.

‡ "He must have crossed over the Salinas (Rio Azul) and ascended that river. It is surprising that he makes no mention of large buildings or ruins upon its banks."—(*Whipple.*)

§ "It is remarkable that at the present day many of the Indians of Zuñi are white. They have a fair skin, blue eyes, chestnut or auburn hair, and are quite good-looking. They claim to be full-blooded Zuñians, and have no traditions of intermarriages with any foreign race. The circumstance creates no surprise among this people, for from time immemorial a similar class of persons has existed in the tribe."—(*Whipple.*)

days of the year. The houses are of lime and stone; the gates and small pillars of the principal houses are of turquoises; and all the vessels wherein they are served and other ornaments of their houses are of gold. The other six cities are built like unto this, whereof some are bigger, and Ahacus is the chiefest of them. At the south-east there is a kingdom called Marata,* where there were wont to be many great cities, which were all builded of houses of stone, with divers lofts. And these have and do wage war with the lord of the seven cities, through which war the kingdom of Marata is for the most part wasted, although it yet continueth and maintaineth war against the other.

"Likewise the kingdom of Totonteac† lieth towards the west—a very mighty province, replenished with infinite store of people and riches; and in the said kingdom they wear woollen cloth, made of the fleece of those beasts previously described; and they are a very civil people." He told also of another kingdom, called Acus.‡ Here they showed him a hide half as big again as the hide of an ox, which they said belonged to a beast with one horn. The colour of the skin was like that of a goat, and the hair was a finger thick.

The inhabitants requested him to stay here three or four days, because from this place they were "four days' journey into the desert, and from the first entrance into the same desert unto the city of Cevola are fifteen great days' journey

* I believe this to have been in the upper valley of the Rio Gila, where so many ruins still remain.

† Totonteac is doubtless the country lying upon the waters of the Rio Verde and Pueblo Creek. Civilisation and the arts must have made considerable progress there, but the valleys are now quite deserted.

‡ The position of the kingdom of Acus is not mentioned. It may have been upon the Colorado Chiquito, or in the Cañon de Chaco; at both places there are ancient ruins already described.

more." Accompanied by thirty of the principal Indians, with others to carry the provisions, he entered this second desert on the 9th of May. He travelled the first day by a very broad and beaten way, and came to dinner unto a water, and at night unto another water, where the Indians provided him with a cottage and victuals. In this manner he travelled twelve days' journey. At that point he met one of Stephen's Indians, who, "in great fright and covered with sweat," informed him that the people of Cevola had at first imprisoned and afterwards killed the negro.

Father Marco himself then became fearful of trusting his life in the hands of that people. But he told his companions that he "purposed to *see* the city of Cevola, whatever came of it." So he ascended a mountain and viewed the city. He describes it as "situated upon the plain at the foot of a round hill,* and maketh show to be a fair city; and is better seated" than any that he has seen in these parts. The houses "were builded in order," according as the Indians had told him, "all made of stone, with divers stories and flat roofs. The people† are somewhat white; they wear apparel, and lie on beds; their weapons are bows; they have emeralds and other jewels, although they esteem none so much as turquoises, wherewith they adorn the walls of the porches of their houses, and their apparel and vessels; and they use them instead of money through all the country. Their apparel is of cotton and of ox-hides, and this is their most commendable and honourable apparel." They use vessels of gold and silver, for these metals are found in greater abundance here than in Peru. They buy the same for turquoises in

* This description answers quite well to Zuñi at the present day. See engraving, page 164.

† "The following he would not have seen, but probably states on the authority of his informers."—(*Whipple.*)

the province of Pintados,* where there are said to be mines of great abundance. Of other kingdoms he says he could not obtain such particular information. When he told the Indian chiefs that were with him what a goodly city Cevola seemed, they answered him that it was the least of the seven cities, and that Totonteac was the greatest and best of them all, because it had so many houses and people that there was no end to them. Having set up a cross and made a heap of stones, he named that country El Nuevo Regno de San Francisco. Then, "with more fear than victuals," he returned. In two days he overtook the people he had left behind, crossed the desert, hurried from the valley, and passed the second desert. Having arrived at the valley of the Gila, he determined to visit the great plain he had been informed of towards the east; but for fear of the Indians, did not go into it. At its entrance he saw "but seven towns" of a reasonable size, which were afar off in a low valley,† being very green, and having a most fruitful soil, out of which ran many rivers.

Fired by the high-coloured reports brought back by Father Marco, Francisco Vasquez de Coronado, already famed as a great soldier and explorer, determined himself to start for Cevola. His expedition was composed of the flower of Spanish chivalry, and as he marched northward through Sonora by land, Fernando Alarçon, with two ships, was sent up the coast to render assistance should occasion require. It was not known at that time (1540) that Lower

* In the mountains around Tucsan many gold and silver mines have been discovered, proving that there must have been some foundation for this statement.

† These pueblos have already been referred to; he probably passed the Pinaleño Cordilleras to the eastward, and looked down upon a part of the upper valley of the Gila.

California was united to the mainland, so that Alarçon soon found his progress stopped at the head of the Gulf of California. He ascended the Rio Colorado for eighty-five leagues, and not encountering Coronado, returned by water to New Mexico.

Soon after Coronado had started, one Melchior Diaz set out after him, with twenty-five men. He, however, by directing his course to the westward, also discovered the Colorado, and returned to Mexico by sea, bringing back the first announcement that Lower California was not an island. He described the Indians along the Rio Colorado as being a very tall race, almost naked; the men carrying banners, and bows and arrows; the women wearing feathers and an apron of deer-skin. Their noses were pierced, ornaments hung from their ears, and the warriors smeared themselves with bright-coloured paint.

Nearly at the same time Coronado, having penetrated with his party to Zuñi, despatched one of his officers, Garci Lopez de Cardenas, with a detachment of men to the Moqui villages, and this party made a third discovery of the Rio Colorado, many hundred miles above its source. After travelling for twenty days through a broken volcanic country, where they experienced great scarcity of water, they suddenly came upon a deep cleft in the earth's surface which barred all further progress. Lopez describes it as being deeper than the side of the highest mountain, while the surging torrent below seemed not more than a fathom wide. Two men tried to descend, but after with difficulty climbing down a third of the way they were stopped by a rock, which, although from above it did not appear larger than a man, was, in reality, higher than the tower of the cathedral at Seville. "In no other part of the continent had they seen so

deep a gulf, hollowed out by a river for its course." Thus the discovery of the Great Cañon of the Colorado dates back to the year 1540.

Coronado's trip to Cevola does not seem to have been quite as prosperous at first as that of Father Marco. He met with great hardships, and lost many of his horses and men before reaching the Rio Gila, and, after resting there two days, seems to have had great difficulty in making his way through the Mogollon Mountains. "But," he continues, "after we had passed thirty leagues of the most wicked way, we found fresh rivers and grass, like that of Castile, and many nut trees (Piñon pines), whose leaf differs from those of Spain, and there was flax, but chiefly near the banks of a certain river, which therefore we called El Rio del Lino (Colorado Chiquito*). Here he was met by some people of Cevola, who first appeared friendly, but afterwards attacked his army very valiantly. At last he arrived at the walls of Zuñi, and sent messengers thither, but they were ill treated and fired at, upon which, after an attack and skirmish without the walls, he boldly assaulted the city, and, after considerable resistance, took it by storm. The Indians fought with bows and arrows, and threw stones upon them from the walls. Coronado himself was twice unhorsed, but his Spanish armour saved him. Plenty of corn was found in the town, of which they were greatly in need, several persons having starved on the way. "It remaineth now to testify," writes Coronado, "of the seven cities, and of the kingdoms and provinces whereof the father provincial (Friar Marco) made report to your lordship; and, to be brief, I can assure your honour he said the truth in nothing that he reported, but all was quite contrary, saving only the names of the cities and the

* Still called Flax River.

great houses of stone, whereof there are about two hundred encompassed with walls, and I think that with the rest of the houses which are not so walled there may be together five hundred." In other words, the conqueror found neither silver, gold, nor precious stones, but he gives a very accurate description of the appearance, dress, and mode of living of the people, which does not differ in any particular from that of the present day. "The seven cities are seven small towns, all made with these kind of (many-storied) houses that I speak of; they stand all within four leagues together, and are called collectively the kingdom of Cevola." . . . . "They eat the best cakes I ever saw, and they have the finest order and way of grinding, so that one Indian woman of this country will grind as much as four women of Mexico." . . . . "That which these Indians worship, as far as we hitherto can learn, is the water, for they say it causeth their corn to grow and maintaineth their life." As regards the answers they gave him about other cities, Coronado says that he thinks they do not tell him the truth. They said that they killed the negro, Stephen, because "he touched their women."

After leaving Zuñi, Vasquez de Coronado travelled eastward into the Rio Grande valley, and discovered, or rather re-discovered, the pueblos built upon that stream. Amongst these were Acuco (Acoma), "a town upon an exceeding strong hill," Tiguex (Pecos), Quivera, Axa, and Cicuic, four leagues from which they met with a new kind of oxen (buffalo), wild and fierce, whereof the first day they killed fourscore, which sufficed the army for flesh. "All the way was as full of crooked-backed oxen as the mountain sierras in Spain are of sheep." Nowhere did they find gold, silver, or precious gems; and in the end of March, 1542, Vasquez Coronado, after receiving a severe fall from his horse while

tilting at Tiguex, returned in disgust with his army to Mexico. "It grieved Don Antonio de Mendoça very much that the army returned home; for he had spent about three-score thousand pesos of gold, and owed a great part thereof still."

The Abbé Domenec states that as early as the year 1542 the Spaniards had gained possession of no less than seventy-one towns, distributed amongst fourteen provinces,* of which Tiguex formed the centre, and Cevola probably the furthest westward. These provinces, therefore, do not include any of the communities celebrated in those days, such as Totonteac, Moqui, Acus, Marata, &c., which occupied regions far removed from the Rio Grande.

On the 10th of November, 1582, another expedition, headed by a citizen of Mexico, called Antonio de Espejo, left the valley of San Bartolo (160 leagues from the city of Mexico) to explore the Rio del Norte, and to discover the fate of two friars, Lopez and Ruyz, who were reported to have been murdered there.

Directing his course northward, he met with great numbers of Conchos (Papagos), who dwelt in villages or hamlets covered with straw. These Indians went nearly naked, cultivated maize, pumpkins, and melons, and were armed with bows and arrows. They worshipped neither idols nor aught else. The caciques sent information of the expedition from one town to another, and the party was well treated. They passed through the Passaguates, the Zoboses, and the Jumanes, who were called by the Spaniards Patarabueges. "Their villages are upon the Rio del Norte; their houses

* The provinces were—Cevola, containing 7 towns; Tucayan, 7; Acuco, 7; Tiguex, 12; Cutahaco, 8; Quivix, 7; Sierra Blanca, 7; Ximena, 3; Cicuyè, 1; Hemes, 7; Oji Caliente, 3; Yuque-Yunque, 3; Braba, 1; Chia, 1:—in all 71.

are flat-roofed, and built of mortar and stone." These people were well clothed, and seemed to have some knowledge of the Catholic faith. Ascending the great river, they discovered another province of Indians, who showed them many curious things made of feathers, with divers colours, and many cotton mantles striped blue and white, like those brought from China. These people showed by signs that five days' journey westward there were precious metals.

Journeying thence northward along the Rio del Norte, they were well received amongst a numerous population. Here they were told by a Concho Indian who accompanied them, that fifteen days' journey towards the west could be found a broad lake,* and great towns with houses three and four stories high. They noted especially the excellent temperature of the climate, good soil, and abundance of precious metals.

From this province they travelled fifteen days without meeting any one, passing through woods of pine trees bearing fruit like those of Castile.

Having thus travelled eighty leagues, they arrived at villages where there was much excellent white salt. Ascending the valley of the aforesaid great river twelve leagues further, they arrived at the country which they called New Mexico. Here all along the banks of the river grew mighty woods of poplar (cotton-wood), in some places four leagues broad, and great store of walnut trees and vines, like those of Castile. Having travelled two days through these woods, they arrived at ten towns situated upon both sides of the river, where were about ten thousand persons. Here were houses four stories in height, with "stoves for the winter season." They had

* Probably the Laguna de Guzman and the pueblos on the river which feeds it.

"plenty of victuals and hens of the country." "Their garments were of cotton and deer-skins, and the attire, both of men and women, was after the manner of Indians of Mexico." "Both men and women wore shoes and boots, with good soles of leather—a thing never seen in any other part of the Indies." "There are caciques who govern the people, like the caciques of Mexico, with sergeants to execute their commands. In all their arable grounds, whereof they have great plenty, they erect on the one side a little cottage, or shed, standing upon four poles, under which the labourers eat and pass away the heat of the day, for they are a people much given to labour." "This country is full of mountains and forests of pine trees." "Their weapons are strong bows and arrows pointed with flints." "They use also targets or shields made of raw hides."

After remaining four days in this province, not far off they came to another called the province of Tiguas (Tiguex), containing sixteen towns, in one of which the two friars, Lopez and Ruyz, had been slain. Hence the inhabitants fled. The Spaniards, entering the town, found plenty of food, hens, and rich metals. Here they heard of many rich towns far toward the east. Two days' journey from the province of Tiguas they found another province, containing eleven towns and about forty thousand persons. The country was fertile, and bordered on Cevola, where was abundance of kine. Here were signs of "very rich mines." Having returned to Tiguex, they ascended the Rio del Norte six leagues to another province called Los Quires. Here they found five towns, and fourteen thousand persons who worshipped idols. Among the curious things seen at this place were a pig in a cage and "canopies like those brought from China," upon which were painted the sun, moon, and stars. The height of the

pole-star led them to believe themselves in north latitude 37½°.

Pursuing the same northerly course, fourteen leagues thence they found another province, inhabited by Cumanes (or Punames), with five towns, of which Cia (Zia) was greatest, having twenty thousand persons, eight market-places, and houses plastered and painted in divers colours. The inhabitants presented them with mantles curiously wrought, and showed rich metals, and mountains near which were the mines. Having travelled six leagues north-west, they came to Ameies, "where are seven great towns and thirty thousand souls." One of the towns was said to be very great and fair; but as it stood behind a mountain they feared to approach it. Fifteen leagues west they found a great town, called Acoma, containing about six thousand persons, and situated upon a high rock, which was above fifty paces high, having no entrance except by stairs hewed into the rock. The water of this town was kept in cisterns. Their corn-fields, two leagues distant, were watered from a small river, upon the banks of which were roses. Many mountains in this vicinity showed signs of metals; but they went not to see them.

Twenty-four leagues westward from Acoma they arrived at Zuñi, by the Spaniards called Cibola, containing great numbers of Indians. Here were three Christian Indians, left by Coronado in 1540. They informed Espejo that "threescore days' journey from this place there was a mighty lake, upon the banks whereof stood many great and good towns, and that the inhabitants of the same had plenty of gold, as shown by their wearing golden bracelets and earrings." They said that Coronado intended to have gone there, but having travelled twelve days' journey, he began to want water, and returned. Espejo, desirous of seeing this rich country,

departed from Cibola, and having travelled twenty-eight leagues west, found another great province* of about fifty thousand souls. As they approached a town called Zaguato, the multitude, with their caciques, met them with great joy, and poured maize upon the ground for the horses to walk upon, and they presented the captain with forty thousand mantles of cotton, white and coloured, and many hard towels with tassels at the four corners, and rich metals which seemed to contain much silver. Thence travelling due west forty-five leagues, they found mines, of which they had been informed, and took out with their own hands rich metals containing silver. The mines, which were on a broad vein, were in a mountain† easily ascended by an open way to the same. In the vicinity of the mines there were numerous Indian pueblos. "Hereabout they found two rivers‡ of a reasonable bigness, upon the banks whereof grew many vines bearing excellent grapes, and great groves of walnut trees, and much flax, like that of Castile."

Captain Espejo then returned to Zuñi. Thence he determined to ascend still higher up the Rio del Norte. Having travelled sixty leagues towards the province of Quires, twelve leagues further east they found a province of Indians, called Hubates, containing twenty-five thousand people well dressed in coloured mantles of cotton and hides. They had many mountains full of pines and cedars, and the houses of their towns were four or five stories high. Here they had notice of another province, distant one day's journey from thence, inhabited by Indians, called Tamos (Toas), and containing

* Mohotze (Moqui?)

† Probably San Francisco Mountain, near which are large ruins described by Captain Sitgreaves.

‡ Probably the Colorado Chiquito (Rio del Lino) and Rio Verde.

forty thousand souls. But this people having refused admittance to their towns, the Spaniards returned, and following 120 leagues down a river called Rio de las Vacas (Rio Pecos), united again with the Rio del Norte, and went homeward in July, 1583. In conclusion, the author adds,—"Almighty God vouchsafe His assistance in this business, that such numbers of souls redeemed by His blood may not utterly perish; of whose good capacity, wherein they exceed those of Mexico and Peru, we may boldly assert that they will embrace the Gospel and abandon such idolatry as now the most of them do live in."

If this account of Antonio de Espejo be a tolerably accurate chronicle of facts, the Rio Grande valley must have been very well peopled. He describes no less than sixteen provinces or kingdoms, and mentions others from hearsay; and if his estimates of population at all approach the truth, there were far more people in that one valley in the sixteenth century than there are now in the whole of New Mexico and Arizona united, including both Mexicans and Americans.

Although the Pueblo Indians seem to have been unacquainted with the working of metals, yet we hear reports of gold and silver being discovered after this time (1582) in many parts of the very country which was reported by its discoverers to be utterly unworthy of colonisation. It would, however, be giving the subject more attention than is here desirable, were I to quote further from Spanish sources, especially as I think the chief object has been already gained, namely, of proving that the towns now in ruins were thickly inhabited when the first Europeans entered the country.

CHAPTER V.

THE RISE AND FALL OF PUEBLO INDIAN POWER IN NORTHERN MEXICO.

The Pueblo Indians come from the South; they subdue the savages and colonise New Mexico.—They discover the Rio Grande at its source, and spread down that valley from the North.—They found populous towns.—The Spaniards subdue and enslave them.—They rebel and are reconquered.—Spanish Grants.—The wild tribes become dominant, and complete the ruin of the Aztecs.—Physical changes in the country.—Conclusion.

Looking at the question of the rise and fall of Pueblo Indian power in New Mexico and Arizona from a geographical as well as an historical point of view, I have come to the following conclusions respecting it; but in expressing these views I do not bind myself very closely to them, for I think it quite probable that far more light may some day be thrown upon this interesting subject by others, who will be able to bridge over many gaps in the evidence which now form almost impassable barriers to a complete line of argument.

These town-building Indians, I consider, were the skirmish line of the Aztec race, when that race was united and in the plenitude of its power. They came originally from the southern provinces of Mexico, probably in separate detachments—the restless spirits of semi-civilised tribes, speaking distinct dialects, although more or less united under one central government; and they tried, with all the skill brought from Anahuac and the southern provinces of Mexico, to colonise the outlying countries to the northward. The route taken by these Aztec pioneers was probably that which the physical geography of the country naturally suggests,

viz., through the provinces now called Sinaloa and Sonora, west, of course, of the main Cordilleras, to the Gila valley, and thence northward, along the tributary streams of that river towards the Great Cañon of the Colorado. Some followed the Gila, across the Gila desert, to its mouth, and thence up the Colorado, until, attracted by the fertility of some of its valleys, they planted a colony on its banks, and appear to have fraternised to a great extent with the native tribes of that district. And thus it was that Captain Fernando Alarçon, who, in 1540, discovered the Rio Colorado, "having passed various tribes," as he ascended the stream, "without being able to communicate except by signs, at length reached a people who understood the language of an Indian he had brought with him from Mexico, and told him of a similar people who dwelt far to the eastward in great houses built of stone, wore long white robes, and came yearly to the river to buy maize; for their fields were small, whereas the lands along the Colorado being subject to an annual overflow, produced food in abundance."*

The main stream of emigration evidently flowed northward; the rich bottom-lands along the Gila were occupied and placed under irrigation; the valleys of the Rio Verde, Salinas, and other streams were taken possession of; and the Apaches, who probably carried on agriculture to some extent along their banks, were driven into the mountains. These savages were probably treated by the Aztecs as barbarian hordes, whom they found it impossible thoroughly to subdue, but who harassed them perpetually, and obliged them to

* The tribe here spoken of may be the Mojaves; if so, contact with the neighbouring tribes must have caused them sadly to degenerate, for at present they are polygamists, like the other Colorado tribes, and do not seem superior to them in intellect or manner of living.

devise means of protecting their settlements against surprise, and their rich corn-fields from pillage. Thus they introduced the art of building houses of stone and adobe from Mexico into their newly-acquired territory, and adopted that system of communism in their fortified towns which best suited their purpose. They chose commanding positions upon the summits of the mesas overlooking large tracts of fertile bottom-land, and added story to story in such a manner that a few resolute defenders could keep almost any number of assailants, similarly armed, at bay. The Apaches seem to have been at last so successfully kept under, that Father Marco and Vasquez de Coronado were conducted by the Aztecs through the very centre of a country which is now entirely given over to the savages, and across which no one at the present time would dream of passing. Nor do we hear much about these sons of plunder until nearly the middle of the eighteenth century.

The town-builders gradually pushed their way northward to Pueblo Creek, the Aztec Mountains, and the San Francisco Peaks; but on trying to penetrate further, their progress was suddenly arrested by an impassable barrier—the cañons of the Colorado and Flax (Chiquito) rivers, which, united, form a gulf three hundred miles at least in length, directly across their course.

Stopped more effectually by nature than by any barrier man could devise, they naturally rejected the worthless regions lying to the westward, and turned their course towards the east, occupying the fine valleys of the Colorado Chiquito above its cañon, and following its branches to their source. Having established the kingdom of Cevola, of which Zuñi was the capital, and several other clusters of towns on the neighbouring streams, they commenced to push still

further up into the Navajo country, and tried to protect themselves wherever they went against that tribe by building fortified towns. Thus the seven Moqui villages were built, and, still further to the north, another cluster of ruins bears record of yet one more colony. To the north-eastward they passed from the heads of Flax River to the southern branches of the San Juan, where they built many populous towns, as the ruins in the Cañon de Chaco and the Valle de Chelly bear witness, until at last, by following up the head-waters of the Rio de San Juan into the mountains of Colorado, they entered the commencement of the Rio Grande valley, and thus discovered a new and still finer region to colonise and to subdue.

Gradually they worked down the valley from the *north, as their traditions assert*, and very naturally built a large stronghold at Toas, to protect that magnificent valley against the attacks of Utes from the mountains, to which it was exposed. In time the entire valley was peopled and studded with groups of towns from latitude 37° to 32°, a distance of over four hundred miles. So numerous did the Pueblo Indians become in the main valley that they found it unnecessary to live in fortified towns there; but the settlements on the outskirts, such as Pecos, Quarra, or Gran Quivera, where raids from the Buffalo Indians (Arapahoes and Comanches) were to be feared, or Laguna and Acoma, unpleasantly near the homes of the Navajos, were constructed on the same plan as those in the Colorado basin, and were quite as strongly fortified.

Lastly, it is so short and easy a route from the Rio Grande valley about El Paso—which district, according to early Spanish authorities, contained many towns and a great number of people—to the beautiful and fertile valley of the

Rio Corralitos and its lake, the Laguna de Guzman, that I feel convinced the Casas Grandes on this stream were built by a colony from thence, and that the people now occupying it were quite right when they told Mr. Bartlett that the big houses were built by Montezuma's people, who came there *from the north.*

Thus it is that the town-building Indians of New Mexico, not having any record of their former emigration from Old Mexico, have introduced the worship of Montezuma and a state of civilisation quite unknown in North America, and yet affirm in many oft-repeated traditions that they came from *the north*—the head-waters of the Rio Grande.

They are right as far as they go, but they seem to me to have misled every authority I have met with on the subject, some of whom have expended much ingenious argument in trying to prove that they came from the north-western part of the continent (perhaps originally from Kamtschatka), that they crossed a region occupying the upper basin of the Colorado, inhospitable enough to repel any colonists under the sun, and that their town building and Montezuma worship were of indigenous growth, founded by that great emperor himself.

This is certain, viz., that as one community claims the head of the Rio Grande as the birthplace of the great king, another, some district in its own part of the country, and so on, there is no reliance whatever to be placed on any such attempts at local exaltation; but that these people are an offshoot of the race which, under the name of Aztec, overspread Mexico previously to the invasion of the Spaniards, there is, I think, very little doubt.

As late as the end of the sixteenth century all or nearly all the ruins scattered throughout the country, besides many

lesser ones now worn away, were inhabited; and the country, according to Spanish accounts, was very fairly populated. At first the Spaniards were received with confidence and kindness: they seem to have been welcomed, by a race striving after civilisation, as superior beings come to help them in their struggle against barbarism. But they soon found that conquest and conversion by force to a new creed were the ruling passions of the intruders, and that they must fight to the last to protect their homes.

From the scraps of information furnished us by Spanish missionaries and commanders we know that the stand these people made for freedom was a long and gallant one. But it was, of course, useless.

The Papagos, who rendered so much assistance to the earliest pioneers, made a most protracted resistance; and, after years of warfare, at last united in a body, invoked their deity, who was supposed to live on the summit of Babuquivari peak, placed all their families, cattle, and worldly goods in a situation of safety, and risked and lost their all in one final battle. Since then they have forsaken their old faith, and remained in peace with the Mexicans.

All the Pueblos were at last subdued, even to the Moquis, far to the northward, who, before the middle of the seventeenth century, had been "wholly converted and reduced" by the zeal of the Franciscans.

Until 1680, the Spaniards appear to have held undisputed sway everywhere; and they adopted their usual course of enslaving the entire population. They colonised the country in considerable numbers, explored the mountains for precious metals, and did a great deal of mining in many places.

If slavery when applied to field labour is destructive to life, what must it be when directed to mining? By means of

manual labour alone—that is, by carrying the ore in hand-baskets from the "labores," and the water of the deeper workings in buckets, and by grinding the quartz in the rude "arastras," to which men were yoked—large fortunes were made by the conquerors. The ruins of a large prison at the copper-mines in the Miembres Mountains, old mines discovered in greater numbers year by year, which have been carefully stopped up, as well as the traditions of the Indians, all show clearly how the Spaniards used their power.

At last the miserable Pueblos could bear their degradation no longer, and rose throughout the entire country upon their task-masters. Thoroughly detesting the Spaniards, they gave no quarter, and swept them completely from the land. The inhabitants of Santa Fé escaped with their lives down the Rio Grande and founded El Paso, which was the most northern point retained by the whites.

The people of Moqui joined with all their other neighbours in the insurrection, and renounced the Catholic faith. They were never afterwards brought under subjection, nor was the Cross again planted either there or at Zuñi. As regards the other "kingdoms," they were gradually retaken; but not until seven years of hard fighting had thoroughly crushed the inhabitants. We may be tolerably certain that, after massacring their kinsfolk and renouncing Christianity, the Pueblo Indians received no mercy from the Spaniards.

When peace and Christianity were again restored, a more humane policy seems to have been inculcated from the home government and strongly demanded by the clergy on behalf of their poor brethren. As early as the year 1551 we find statutes amongst the laws of Spain laying down, "in the first place, what means are most suitable for the instruction of the Indians in the Holy Catholic Faith," &c.; and in the second

place, providing that "the Indians should be brought to settle," and that such lands be chosen for them as are "healthy, ascertaining if there may live in them men of great age, and youths of good condition . . . . whether animals and flocks are healthy and of ample size . . . . fruits and articles of food good . . . . the land suitable for sowing . . . ." (Charles V., 21st March, 1551. Decrees dated June 26th, 1523, and Dec. 1st, 1543.) Also decrees of Philip II., 1638, are to a similar effect. But one dated Madrid, June 4th, 1687, is of especial importance, for it no longer talks of placing the Indians upon reservations; but it extends the system of giving Spanish grants to the Pueblo Indians, and it presents them with those very letters patent which they now hold, and which the United States Government has promised to respect.

The following are a few abridged quotations from it:—

"Whereas, as in my Royal Council of the Indos, the Marquis Folces, Viceroy of New Spain, ordered that each pueblo as might need land to sow, &c. . . . . should be given 5,000* varas, and more if necessary, and that no land should be granted to any one nearer than 1,000 varas, cloth or silk measure, to the houses and lands of the Indians. . . . . And whereas these Indian lands have been encroached upon by owners of estates and lands, thereby depriving the Indians of them, and seizing upon them, sometimes violently, sometimes fraudulently, for which cause the miserable Indians have lost houses and towns, which is what the Spaniards seek for and desire. . . . . I have thought it wise to order and command that there be given and assigned generally to all the Indian pueblos of New Spain for their farming lands *not only* 5,000 varas around the place of settlement, measured from

* 5,000 varas = 1 legua = 2·636 English miles.

the farthest house in the place north, south, east, and west, and not from the church (generally placed in the centre of the village), but also 1,000 varas more, and shall be authorised to mark off as many more varas of land as shall appear necessary without limitation."

The size of these grants differs considerably amongst the pueblos. In eight pueblos each grant covers between 17,000 and 18,000 acres; Isleta contains 110,000 acres; Santa Domingo, 74,000 acres; the smallest is 13,000 acres. Most of them date back to 1689, two years after the passing of the above Act. The date of the patent of Sandia is 1748. Thus, then, we have a distinct acknowledgment by the Spanish government of the necessity for granting special licenses to this industrious and semi-civilised people.

One of the greatest evils, however, which existed under Spanish rule was the almost entire absence of responsibility in officers sent out to govern the remote provinces. However poor the masses became, the men in office must grow rich. It mattered but little how much native labour was consumed, so long as the coffers of the wealthy were rapidly replenished. And thus it happened that the Pueblo Indians gradually decreased; wars and slavery did their worst, until they were unable in many places even to hold their own against the Apaches, who, quick in discovering the weakness of their neighbours, did not hesitate, we may be sure, in trying to complete their ruin.

All the pueblos situated along the Rio Verde, the Salinas, and other northern branches of the Gila were from their position most exposed to attack. The dead tell no tales; but if those ruins could speak, I think they might relate dismal stories of crops yearly destroyed all around them, of cattle run off by thousands, of famished children calling for

bread, and of sons and fathers left dead amongst the mountains. The pueblos on Pueblo Creek, those on the streams in the Navajo country, and others similarly situated, shared the same fate; the Indians of Zuñi, the Pimas, and the Papagos were able to protect themselves. The Moquis were saved by the impregnable nature of their country, and the remnant of the kingdoms in the Rio Grande valley were, of course, protected by the Spanish population.

The time at last came when the strong military establishments, so well kept up when Spain was powerful, gradually fell to decay as troops were required to maintain the semblance of power in the southern provinces, and thus the Mexicans, as well as the Pueblos, found themselves unequal to the task of keeping the savages at bay.

No further proof is required of this statement than the following quotation from Miguel Venegas' "History of California," dated 1758. After accurately describing the dimensions of the Apache country, he continues:—"Within a circuit of three hundred leagues the Apaches reside in their small rancheras erected in the valleys and in the breaches of the mountains. They are cruel to those who have the misfortune to fall into their hands; and amongst them are several apostates. They go entirely naked, but make their incursions on horses of great swiftness, which they have stolen from other parts. A skin serves them as a saddle. Of the same skins they make little boots or shoes of one piece (moccasins), and by these they are traced in their flight. They begin the attack with shouts at a great distance, to strike the enemy with terror. They have not naturally any great share of courage; but the little they can boast of is extravagantly increased on any good success. In war they rather depend upon artifice than valour; and on any defeat submit to the

most ignominious terms, but keep their treaties no longer than suits their convenience. His Majesty has ordered that if any require peace, it should be granted, and even offered to them before they are attacked. But this generosity they construe to proceed from fear. Their arms are the common bows and arrows of the country. The intention of their incursions is plunder, especially horses, which they use both for riding and eating, the flesh of these creatures being one of their greatest dainties.

"These people, during the last eighty years past, have been the dread of Sonora, no part of which was secure from their violence. . . . Of late years, the insolence of these savages has been carried to the most audacious height from the success of some of their stratagems, particularly owing to the variances and indolence of the Spaniards. . . . The Apaches penetrate into the province by different passes, and, after loading themselves with booty, will travel in one night fifteen, eighteen, or twenty leagues. To pursue them over mountains is equally dangerous and difficult, and in the levels they follow no paths. On any entrance into their country, they give notice to one another by smokes or fires; and at a signal they all hide themselves. The damages they have done in the villages, settlements, farms, roads, pastures, woods, and mines are beyond description; and many of the latter, though very rich, have been forsaken."

No better description than this could be given of the Apaches at the present time.

With respect to Casas Grandes, in Chihuahua, these pueblos, when built, were evidently liable to the incursions of the Apaches, otherwise they would not have been constructed as fortified towns. But rich mines were early discovered in the mountains hard by, and extensively worked by the

Spaniards ; so that it is impossible to say whether slavery or the Apaches, or both, caused the destruction of the entire population.

It only remains, in concluding this account of the Pueblo Indians and their history, to say a few words on a subject usually brought forward as chief amongst the causes which have led to the extinction of that race.

I have heard it affirmed on all sides that the country has become depopulated because it is no longer capable of sustaining its former inhabitants, and that as the face of nature changed, so did those dependent upon nature diminish. The country *has* changed for the worse. A few centuries ago, the rain-fall was greater ; forests were more abundant ; spots were productive which now are barren ; and springs gushed from the ground which now are dry. But at this period, also, a much larger area of land was probably under cultivation—both with and without irrigation—than to-day ; and I think it far more likely that the decrease in the amount of land cultivated tended to produce aridity than that the change of climate made the country uninhabitable. The Spaniards probably did great mischief by stripping the hills of timber for mining purposes, and thus drying up springs, the waters of which were so needed in the valleys. The greater part of the Rio Grande was swept of its timber, and is very different now from what it was when Antonio de Espejo visited it in 1582.* The Apaches also have a very destructive habit amongst their long catalogue of vices of firing the forests of their enemies. Although these facts may account for the gradual drying up of the country, they will not explain how it happens that the

* The engraving of the Rio Grande, in Chap. i., Part III., represents it as well timbered; this view, however, was taken in a district quite uninhabited, and one, moreover, which has remained so for a very long period.

fertile bottom-lands along the Rio Verde—a country, according to Leroux, "well timbered, and containing many lagoons"—are now uninhabited; while the people of Moqui, who live almost in a desert, have managed to fight out the battle of existence down to the present day.

Colonel Greenwood, who had charge of one of our engineering parties, discovered two very remarkable objects near the San Francisco Mountains. One was a broken jar, into the hollow of which lava had flowed. The other was the skeleton of a man, encased in the same material. If the colonel was not deceived, it is certain that some of the lava which now covers large tracts of country in many parts of New Mexico, and especially Arizona, and still looks bright and fresh, was poured over the surface within the present epoch, but it cannot prove that either the convulsions of the earth or climatic changes produced by them so altered the condition of the land that it starved out its inhabitants. The natural workings of cause and effect are, I think, sufficient to account for the present desolation of these regions, without calling to our aid either meteorology or geology.

PART III.

FROM THE RIO GRANDE DEL NORTE TO THE PACIFIC OCEAN.

FROM THE RIO GRANDE DEL NORTE TO THE PACIFIC OCEAN.

CHAPTER I.

THE RIO GRANDE VALLEY.

Colton and Bell start on a Coal Hunt.—Galisteo.—Revisit the Real de los Dolores.—Tejeras Cañon.—Manzana Mountains.—Albuquerque and the Friends we made there.—Isleta.—The Rio Grande del Norte.—Mexican Ranches.—The Valley, the Plateaux, and the Mountains on either side.—Fort Craig.—Our Surveying Parties reassemble there.—General Wright and Dr. Le Conte leave for the States.—Reorganisation of the Parties under General Palmer.—Open House and open Cellars.—Start afresh, and march seventy miles still further South in the Rio Grande Valley.—Uninhabited for one hundred miles of its length.—La Mesilla Valley.—Last Camp on the Rio Grande, and our Visitors.—This Valley a grand field for Emigration.—Vine Culture.—Two Horses bitten by Rattlesnakes.

Distance, 281 miles.

On the last day of September, after a fortnight's sojourn, Colton and myself, without attendants or luggage, left Santa Fé on an independent search, the object of which was coal. Several spots had been named as coal-bearing districts, and it was necessary to test the truth of these promising reports. Without change of horses, our week's ride was the following :—

		Miles.
1st day	Santa Fé to Galisteo	22
2nd ,,	Carpenter's Ranche (Tejeras Cañon) . . .	40
3rd ,,	Albuquerque (Rio Grande)	18
4th ,,	Visit to coal-fields, eight miles from Albuquerque .	16
5th ,,	Belen (on Rio Grande)	32
6th ,,	Limetar ,, ...	41
7th ,,	Fort Craig ,, ...	42
	Total for the week . .	211

In the object of our search we were by no means successful; not, as we afterwards discovered, because there was no coal in those localities which report led us to visit, but because those who knew of it determined to keep it secret, supposing that the railway company would devise some plan of robbing them of the fruits of their discoveries. This was not surprising amongst the suspicious Mexicans, but so "dog-in-the-manger" a policy is not usually a trait in the character of American frontiersmen. At the village of Galisteo we could not find any one willing to show us the coal veins, although they did not deny their existence. We were surprised to see the large herds of horned cattle owned by the Mexicans here. The whole place bristled with the poles of which the coralles were made, and at sunset these enclosures were crowded with stock. Notwithstanding that hundreds of cows were standing around, not a drop of milk could be got for love or money.

On our way to Tejeras Cañon, a fine natural pass lying between the Placer Mountains and the Zandia, we visited for the second time the hospitable dwelling of Dr. Steck at the Real de los Dolores.

When at eventide, after a long and difficult ride over mountains and ravines, through forests of piñon trees, often without trail of any kind, we reached the ranche of Mr. Carpenter half way through the pass, we soon found by the manner of our host that the object of our search was not to be attained. He could show us plenty of gold quartz veins, kaolin, and gypsum; argentiferous galena also was to be found in many places not far from his ranche; and as for copper, any quantity of it cropped out in the cañon; but of coal there was none; this was the only thing he had not got, —we must have been misinformed, which was not his fault. Such was the information we received; so, after a miserable

supper and breakfast of rusty bacon and very stale bread, we mounted our steeds and went our ways.

The coal vein we thus failed to visit is situated south-west of Carpenter's, not in the Tejeras Cañon proper, but in one of the western ravines of the Manzana Mountains, and is about seventeen miles east of the Rio Grande. A surface specimen given to Dr. Le Conte by Colonel Watts at Santa Fé was of excellent quality.

The road through the mountains down to the plain of the Rio Grande valley is very wild and romantic. The rock exposures are bold and imposing, towering up to the sky, and presenting great varieties of colour and outline; for some are composed of masses of granite; some of sandstone, grey and red; others are of smooth, shining, metamorphic rocks; and again, others consist of marbles beautifully variegated, white, pink, and grey, the fractures remaining bright and sparkling for a very long time in the dry atmosphere of these regions. When in the afternoon we had left the mountains many miles to the east of us, on our way to Albuquerque, and looked back at their sharply-cut sides, perfectly bare, precipitous, and jagged, brilliantly lighted up by the declining sun, the sight was very remarkable, and one long to be remembered. Not a tree is to be seen on the steep western slopes of the mountains, and if there be grass or other vegetation here and there amongst the crevices, it is not noticeable at a distance; everywhere huge masses of variegated rock rise for thousands of feet above the plain, and throw their ever-varying shadows deep and crisp upon each other.

Albuquerque, the second town in rank to Santa Fé, does not present an imposing appearance. It is a straggling collection of adobe houses, scattered amongst innumerable acequias or irrigating ditches, in the perfectly flat lowlands

of the Rio Grande valley. In a direct line it is sixty-three miles from Santa Fé. A few groves and solitary cotton-wood trees give a degree of shade to the place, but beyond this it might be a brick-yard as seen at a distance. Distance here certainly does not lend enchantment to the view, for on close inspection every house is found to possess a garden well filled with peaches, apples, plums of every description, and vines bearing most delicious grapes. Then, as one approaches, fields of Indian corn pop up on all sides, having been hidden from view by the lowness of their position; and, lastly, in the centre of the town, a very inviting church, with twin spires, adds greatly to the appearance of the plaza.

The little American colony here received us most hospitably. In the evening all sat together, a party of nearly a dozen, in the large cool room of one of the resident merchants, and enjoyed a social chat whilst full justice was done to the flowing bowl.

Money-making is, of course, the great desideratum which attracts the white man to so out-of-the-way a country, far from home, and often also from all that is dear to him. Once here, he cares little what he does provided it pays. The most entertaining man of the evening at Albuquerque was a young Southerner, who kept us in roars of laughter with his droll stories, while he did the honours of the evening with the most delightful ease and good breeding. At parting, he told us that we should be called early next morning to visit some of the fruit gardens and take an early breakfast—breakfast No. 1—of grapes and peaches. "You must come and see me on your way," said he; "I am the butcher of Albuquerque, and as the people must have their chops, you must excuse my absence." So next morning, as we were being conducted to the vineyards, we recognised our friend—

with blue blouse and paper cap—knife in hand, performing wonders in dissection upon his slaughtered sheep. Two hours later, on our return to the hotel, we stopped at the office of the *Albuquerque Chronicle*. At the door we met the editor and proprietor, who, to our great amusement, was no other than our facetious host of the night before, the butcher of Albuquerque, and now, bereft of blouse, the energetic editor of the daily paper.

Is not a lesson to be learned from this little sketch of Western life? I would at least respectfully recommend it to the consideration of our would-be emigrants.

From Albuquerque we travelled in the valley of the Rio Grande, 115 miles, to Fort Craig. For the whole of this distance the valley was studded on both sides with numerous villages, some belonging to Pueblo Indians, the greater number to Mexicans. The largest of the former was Isleta, where Colton and myself rested an hour or two at mid-day, after leaving Albuquerque, and enjoyed the produce of a very fine vineyard, cultivated, of course, by the Indians. The houses were built, like those of the Mexicans, of adobe, but were much larger; many were of two stories; all seemed to contain more than one family, and were not entered from the outside or from the roof, as it is common in some pueblos, but generally from an inner court. The irrigating ditches were well built and cared for, and the whole place had a more well-to-do look about it than the Mexican villages generally exhibit. The crops were also finer. Some of the Indians, clothed in buckskin and in fur, lay basking in the sun, and took little or no notice of us as we passed.

The greater part of the valley is here almost entirely destitute of trees. This may be partly accounted for by the fact that the banks of the river are of a sandy, friable nature,

and that the bed of the stream is always changing its position, sometimes to one side, sometimes to the other; thus destroying fields of corn, irrigating canals, and villages; taking from one man and giving to another, covering rich tracts of alluvial soil with sand and rubbish, and undermining the trees which had arrived at maturity on the firm dry land. About latitude 32° 13′ are two flourishing towns, La Mesilla and Los Cruces. Not long ago the river passed between them, but now they both lie on the left bank, the stream having completely changed its channel without disturbing either.

Between the villages we often met with ruins of towns, now quite deserted, but once far more extensive than those still inhabited. These ruins were generally of adobe; but some of the most extensive had stone foundations, and were therefore, without doubt, of Aztec origin.

Our daily wants obliged us often to visit the cottage of a Mexican for lodging or refreshment; and although the latter was usually scanty enough, the former was the perfection of rustic neatness. Household cleanliness is as natural to some nations as "pigstyosity" is to others. Compare the Irish peasantry and the Mexican peons. Both are Roman Catholics; neither, as a rule, are well fed or well clothed; both are indolent by nature; and, as far as brains go, surely the Irishman stands foremost. Yet enter their cottages. In one case you instinctively hold your nose, and back out. In the other you sit on the floor with pleasure, and use it as a table without the least compunction. Although great neatness is the rule wherever I have travelled amongst the Mexicans, the cottages along the Rio Grande, especially towards the south, seemed to be kept with special taste. When shown into the parlour, we would look with dismay at our dusty boots and soiled apparel, for the floor would be often com-

pletely covered with snow-white lamb-furs; the ottomans, or rather the folding mattresses surrounding the room, would be cased in beautifully-washed white cotton counterpanes, or Mexican blankets striped with different colours, but equally pure and spotless as the counterpanes. They have also a neat way of covering the ceilings with canes similar to bamboo-canes, which are arranged in patterns very much like those we often see lining the walls of an English summer-house. Although a frizzled-up mutton-bone, or some sun-dried meat swimming in fat, with tortillas (unfermented bread) about as thin, tough, and tasteless as buckskin leather, are generally all you can confidently look forward to, still you may feel quite certain that your host has done his best. The people are most courteous to their guests; but they seem quite ignorant of the existence of butter, bread, or vegetables of any kind, except in a few of the larger towns. Chili Colorado (red pepper) beans, Indian corn, and mutton (mostly sun-dried) pretty well complete the list of their necessaries of life—not forgetting, of course, tobacco, and water-melons when in season.

On the afternoon of October 6th, after an unusually long stretch (thirty miles) of uninhabited valley, we came in view of the flag which waved over Fort Craig,—a military post, placed on the top of some barren, sandy bluffs overlooking the stream. Between Albuquerque and this point (115 miles), the valley varies in width from five or six miles to a few hundred yards. When I say "the valley," I mean the level central trough between the bluffs or cliffs on either side. It is very seldom, in this distance, that these bluffs approach so close as to hem in the stream and obliterate the valley; and when they do it is only for a very short distance. Isleta is one of these points; San Felipe another; Fort Craig a third.

But, usually, there is a large tract of irrigable land on each side, capable of sustaining a very considerable population.

On ascending the bluffs on either side, you come upon a level grass-covered plain, which slopes up gradually towards the mountains beyond, and usually contains no water whatever. On the eastern side the mountains consist of detached ranges—the Zandia, Manzana, Sierra de Coboleta, and Sierra del Oso. One of these ranges is always within view from the river, but none approach very close to the lower valley. Below Fort Craig, however, the eastern ranges encroach so much on the river as to obliterate the grass-covered plateau, and reduce the bottom-land in many places to an insignificant strip.

On the western side the plateau beyond the bluffs usually slopes back much farther before reaching the mountains, which are far more formidable than those on the eastern side of the valley. These are the Zuñi Mountains, which traverse obliquely 2° of longitude, from Campbell's Pass to the Rio Grande, near Fort Craig, where they seem to be continued on the other side by a range of mountains—the Sierra del Caballo—which hugs the eastern bank. It was thought very naturally by General Wright, that having turned the lower end of this range in the neighbourhood of Fort Craig, we might be able to pass westward, and strike the Rio Gila without going further south; but behind the Zuñi range rises another quite as formidable. Nor was there to be found any break in it which would give the least chance of success for railway purposes until after it had joined the mass of mountains known as the Miembres Mountains, south of latitude 33°. As these formidable barriers form the divide between the waters of the Colorado Chiquito and the Gila on one side (emptying into the Pacific), and those of the Rio

Grande on the Atlantic slope, they have received by the Spaniards the collective name of Sierra Madre, which name must not cause them to be confounded with the Sierra Madre 3° south of them in Mexico proper. This fact is certain, that no railway can ever be constructed across this great western barrier between Campbell's Pass and the Miembres Mountains; and even if it were possible to cross the main divide between these points, and to strike the Rio Gila in New Mexican territory, it would be perfectly impossible to follow that stream through its mountain gorges.

We found all our parties congregated at Fort Craig, for it had been made the general rendezvous previous to reorganisation and a fresh advance westward. Mr. Imbrey Millar, having taken his men safely through the Sangre de Christo Pass, and surveyed a line over that lofty region to the headwaters of the Rio Grande, had rapidly marched with them straight down the valley 380 miles. Mr. Eicholtz and his party had surveyed a good line through the Abo Pass; and Mr. Runk, under the immediate superintendence of General Wright, had continued the main line of survey down the Rio Grande valley from Isleta to Fort Craig.

Having thus far completed the object of the expedition, General Wright's labours in the field came to an end; and here he left us, in company with our geologist, Dr. Le Conte, the one to make up his reports and lay them before the expectant directors, the other to visit the coal-fields near Denver.

Here we found Palmer straining every nerve to hasten as quickly as possible the fresh start. For some time it had been undecided whether the route along the 35th parallel would warrant a separate examination or not; for Jeffer-

son Davis, when Secretary of War, after several elaborate Government surveys had been made, gave the route along the 32nd parallel the decided preference. Palmer, however, after collecting all the information possible throughout the country—after holding consultations with the most experienced guides and prospectors who could by any means be summoned to meet him at Santa Fé and elsewhere—after consulting with the commanders of forts, Indian scouts, Mexican shepherds, and examining every source of information connected with the almost unknown regions to the westward—came gradually to the opposite opinion, and determined that the route along the 35th parallel should be most thoroughly explored. He sent back to Kansas for two more surveying parties under Colonel Greenwood to meet him at Albuquerque, and applied to Government for additional transportation and another escort of sixty cavalry for their protection.

Two parties were intrusted with the examination and survey of the 32nd parallel route. One, under Mr. Runk, was to continue the main line down the Rio Grande so as to strike the passage westward through the Miembres Mountains, known as Cooke's Cañon, which opens upon the vast plain, the Madre Plateau. To Mr. Eicholtz and his party were intrusted the "cut offs," that is, the examination of doubtful passes, which, if practicable, would shorten and improve the line run by Mr. Runk across country which was already known and considered practicable. General Palmer himself, with the third party, viz., that under the command of Mr. Imbrey Millar, was to retrace his steps to Albuquerque, and then, being reinforced by the two fresh parties brought by Colonel Greenwood, was to explore the route along the 35th parallel. Three parties, therefore, were

organised to survey the northern route, and two the southern. I took the latter route.

Before bidding adieu to Fort Craig, I must here acknowledge the great hospitality of Mr. Wardwell, the sutler at whose house General Palmer, Colonel Willis, Captain Colton, and myself remained as guests during our stay there. The good old mediæval custom of keeping open house has very nearly passed away, even from those spots where for ages it was the pride of the proud lords of the soil; but the still more bounteous "institution" of keeping open cellars is not unfrequently met with in the Far West, and nowhere on such a scale as at our host's in Fort Craig. All day long, and often far into the night, did the doors of these capacious vaults remain open. Rows of glasses stood temptingly at the entrance; and below, in dim twilight, might be seen rows of casks, from all of which stuck out the unlocked tap. The barrels were not of beer, but Borbon whiskey and other spirits, El Paso wine, and real Cognac. All who had the slightest claims to acquaintanceship with the host, which in this land of freedom meant "a pretty big crowd," were at liberty to help themselves whenever they felt inclined, and seldom indeed did I approach that seductive cave without hearing the suggestive pop of the champagne cork.

On Tuesday afternoon we started afresh on our journey. I joined Mr. Eicholtz's party. During the week we marched seventy miles due south, to a point on the Rio Grande sixteen miles north of Fort Thorn, where we left the valley by a gentle ascent, and proceeded westward. So much had this portion of the valley been ravaged by the wild Indians—the Apaches and Navajos on one side, and the Comanches on the other—that it was completely depopulated. Travelling down the western side, we passed through the

October 8.

ruins of a large village, formerly known as the Alamosa, about half way between Craig and Thorn. The inhabitants, having abandoned their homes and the rich lands around them, had built another village on the opposite bank, under the protection of a small post, Fort M'Rae, garrisoned by a few United States troops. New Alamosa, as it is called, is the only village we saw on the opposite bank for seventy miles; and on our side, Polomas, a place of some twenty houses, alone remained inhabited. For twenty miles further down the river than we went the valley is abandoned to the lizard and the rattlesnake. Then comes a section where the Mexican population has been strong enough to hold its own, and has been able to plant vineyards and orange-groves, and to gather in their fruits in due season. The district is called the Mesilla valley, and is spoken of with pride by the people of the country as the "Garden of the Rio Grande."

While resting during Sunday at our last camp on the Rio Grande in a large valley, some twenty miles long by six broad, a party of Mexicans and Americans came from Mesilla to meet General Palmer and to give us welcome. The General, of course, was not with us, but we drank his health in fragrant El Paso, grown in the Mesilla valley, and brought to us by our new friends. We were surprised to come across this little party in so lonely and deserted a place. I had much talk with them on the subject of the valley I had just descended for so many hundred miles. They compared the part we were then encamped in with the Mesilla valley, and said that *naturally* it was finer in every respect, but being uninhabited and unirrigated, it was to the eye little better than a parched desert filled with mezquit bushes and brushwood. The opinion expressed by these men, the information I had gleaned from every source, and my own

conviction drawn from close observation, have convinced me that there is no more splendid field now open for emigrants than this long-deserted valley of the Rio Grande del Norte, for the stream itself is not shut up in a gorge or cañon for a single mile through 4° of its course in New Mexico, although only a few miles south of the Mexican boundary-line it becomes almost buried in the earth for 160 miles, so continuously is it enclosed in lofty cañons.

I would especially recommend this fine valley to the consideration of German emigrants who are acquainted with the cultivation of the vine, for no production is so much in demand and commands so high a price throughout the States as drinkable wine of any sort. Champagne, made in Missouri and Ohio, costs from two to four dollars a bottle, and the few good still wines made at Cincinnati bring exorbitant sums. The same may be said of Californian wines; but most of these are of inferior quality, and require doctoring to make them keep. Not so the juice of the Rio Grande grape. Originally, most of the species grown here came from Spain; the fruit is, if anything, too sweet to the taste, and very full-flavoured; but as the amount of alcohol depends chiefly upon the amount of sugar, the wines made from it are very full-bodied, and, judging from the El Paso wine, which alone has received any attention whatever, are likely to develop very high-class qualities when matured by age. As each soil produces its distinct varieties of wine, almost regardless of the original species of grape, it is hard to give an idea of any particular wine by giving it a well-known name. Dr. Le Conte compares the wines now made in small quantities on the Rio Grande to middle grades of Sauterne; but they do not possess the mawkish sweet flavour peculiar to Sauternes, and have a great deal more body. Were I to name Madeira, I

should be equally far from the mark; yet there are qualities about El Paso wine which remind you strongly of those very different wines, and make you fancy you might be drinking them mixed.

The length of the valley from Algodones to El Paso is rather more than 200 miles; the average width is, say, five miles, and if but 40 per cent. of this area is devoted to grape culture, we immediately obtain 400 square miles, or 265,000 acres. Taking the yearly production of wine as low as seven barrels per acre, we have 1,792,000 barrels, or 57,344,000 gallons.

At the lowest computation this wine would fetch one dollar a gallon in the States, so that if we suppose 50,000,000 gallons to be about the proportion transported, and 40 cents per gallon to be paid in freight by rail to St. Louis, we have a yearly revenue to the railway company (in the far distance, no doubt) of 20,000,000 dollars,—a sum sufficient to pay over 12 per cent. on the entire capital,—and 30,000,000 dollars to the grape growers of the Rio Grande valley. But little attention is given to the vine plant either by the Mexicans or Pueblo Indians; they do not even stake it up, but allow the grapes to lie in the dust; but this I noticed everywhere, that the plants were kept well pruned, and not allowed to grow more than 2 or 3 feet from the roots. Irrigation to some extent was always employed; but I think it probable that where any large extent of bottom-land is irrigated for Indian corn or other succulent vegetation, vines will be found to thrive well on the higher lands all around, for they require but little water, and often produce the best qualities of wine on the driest soil.

The accompanying engraving is an exact copy of a photograph I took just before leaving the valley from our camp at

Vincent Brooks, Day & Son. lith

THE RIO GRANDE DEL NORTE, NEW MEXICO.

early morn. An abundance of very large cotton-wood timber is seen in the background. Such views as these are met with everywhere throughout the hundred miles of uninhabited valley; but, thirty miles north of Fort Craig, timber begins to diminish, and the higher you go amongst the settlements the scarcer, unfortunately, it becomes. Twenty years, however, would make the bare parts of the valley quite as beautiful as the uninhabited districts further south, were cotton-wood trees planted along the acequias.

During the last day's march along the Rio Grande two of our horses were bitten by a rattlesnake, the same one having, it is supposed, bitten both in the under lip as they were feeding together in some long grass. I did not see them until a few hours afterwards, and they were then in the most pitiable condition. The submaxillary, parotid, and all glands situated about the head and down the neck became greatly enlarged, disfiguring the poor animals dreadfully. From their nostrils and swollen gums a clear mucous discharge ran down. Their eyes were glairy, pupils greatly dilated, coats rough and staring; they would not look at their corn, and were so submissive that you could do anything with them you liked. They were at the time in the best condition, but one of them had evidently received a much stronger dose of the poison than the other. I gave each of them half a pint of whiskey with a little water, and half an ounce of ammonia. I kept the wounds fomented with a strong infusion of tobacco, and poulticed them with the chopped leaves of the same. I expected that one horse would certainly have died, but both recovered. One, although reduced in flesh and thrown out of condition, was fit for work in a week; but the other only just escaped with his life. He became a perfect skeleton, and would have been abandoned had I not wished to see the

ultimate results. At the end of three months he also began to pick up, and eventually recovered without any abscesses or sloughs having taken place. I saw one horse, which had been bitten in the leg, literally covered with sloughy gangrenous ulcers; these healed, however, and he ultimately recovered.

There is a little weed common throughout the Western country called by Engelmann *Euphorbia lata*, by Torrey *Euphorbia dilatata*, which is said to be a specific for the bite of the rattlesnake. A doctor, whose name I forget, has published an account of his experiments with this plant; he gave a strong infusion of it to a dozen dogs which were in different stages of collapse from snake bites; all recovered but one, and he could not swallow the drug. At the very time when I wanted this plant I could not find it; although I met with it everywhere along our route.

CHAPTER II.

THE MIEMBRES MOUNTAINS AND THE RIO MIEMBRES.

Leave the Rio Grande Valley.—"La Tenaja," or the Water-bowl.—Mule Spring.—Search for Palmer's Pass.—Survey the Pass.—Cooke's Cañon.—The Discovery of Copper in the Miembres Mountains by the early Spanish Explorers.—Subsequent History of the District.—Discovery of rich Gold Deposits.—Success of the Miners until the Indians drove them away.—Work resumed again four years later, but abandoned on account of the Indians.—The Pinos Altos Mines.—Mangas Coloradas.—The Days of Indian Wars are numbered.—The Rio Miembres.—The City of Rocks.—Ojo Caliente.—Colton arrives from Mesilla with Guides.—"Jornadas."

Distance, from Rio Grande to Ojo Caliente, *viâ* Palmer's Pass, fifty miles.

The mountains to the west of our course having gradually merged into rough undulating country formed of bluffs whose ridges run at right angles to the river, we bade good-bye to the Rio Grande, and commenced to survey and explore the first "cut off" by following up one of the ravines to the westward—the Cañada de St. Barbara—towards the Miembres Mountains. Nine miles brought us to a water-hole, called "La Tenaja" by the Mexicans, where three basins, one above the other, were scooped out in a large mass of rock, which here blocks up the channel of the gorge. There is, without doubt, a beautiful cascade here at times; but then (Oct. 14th) the bed of the stream was quite dry, although one of the natural basins was nearly full of good soft water. It was, however, quite inaccessible to the stock, which could only approach the lowest bowl with difficulty. The water had therefore to be poured in bucketfuls from the middle basin down to that below.

Another march of ten miles brought us to the foot of the mountains, and we camped at a spot called Mule Spring, where we found a good supply of water by digging.

The most southern spur of the Miembres Mountains, called, from its highest summit, Cooke's Peak Range, is about twenty-five miles long. Seven miles from its termination it is cut through by Cooke's Cañon; but Palmer had heard at Santa Fé that another pass existed more to the north, that a train of wagons had once passed through it, and that it was practicable for a railroad. We now set to work to find this pass. Our guide, Juan Arrolles, had never even heard of it. Nothing daunted, we started at daybreak next morning, a little party of six, up into the mountains. By twelve o'clock we were resting our panting horses and surveying the peaks all around us from a grass-covered eminence. Looking westward, we saw, a few miles distant, a deep break in the mountains, and a cañon, or narrow arrayo, leading to it. This we followed. Every mile it became better and smoother, and opened straight upon the plain without any precipitous descent. Our delight was great; so we determined to turn back, and trace the cañon, if possible, across the medium line of the mountains, and see if it opened upon the eastern plain from which we had come. After riding all day, we came in view of the eastern plain, just as sufficient light remained to see it, and to prove that our labour had not been in vain. We were still far from camp; mountains were all around us; the sun had set; there was no moon; and darkness soon covered everything. We could not so much as see the face of our compass, and had to keep in the closest single file, for fear of losing each other.

It was in such a predicament as this that the wonderful faculty of locality which is peculiar to the semi-civilised man shone out so conspicuously. Not one of us could tell even the direction of camp; yet the Mexican guide brought us straight to it, after a three hours' ride, over country he had never traversed before, and this, too, in pitch darkness. It was nevertheless a rough ride, for, regardless of obstacles, we went

Vincent Brooks Day & Son lith

LA TENAJA (WATER BASINS IN THE ROCK)

straight over everything, walking, climbing, and riding in turns, until the sight of our watch-fires gladdened our hearts. Our poor horses were quite worn out, for they had travelled at least fifty miles over the pathless mountains.

Next day we continued the survey. Seven miles brought us to the entrance of Palmer's Pass, the name given to it by us. Eight miles more took us to the summit, and a little more than two miles further on we came out upon the plain beyond. The summit is 5,654 feet above tide, 717 above the entrance to the pass, and the average grade is less than 100 feet per mile on the surface, which could be lessened to about 75 feet on construction. By digging we found water at three places in the pass, at two of which we passed a night. No sign of wagon-wheels could anywhere be detected; and an Indian trail which led through it was quite overgrown and almost obliterated. The pasturage was splendid, and there was no scarcity of wood. While the surveyors were running their line through Palmer's Pass, I went with some wagons for supplies to Fort Cummings, and visited Cooke's Cañon, which pass the fort protects. Hundreds of miles before we reached it, I listened with anxiety to the stories told me by the frontier men about the dreadful massacres perpetrated by the Indians in that dread gorge. It was said that even the soldiers dared not stir a mile from the post, and that it was "just a toss up" whether any traveller got through alive. These reports were only the surviving echoes of events which have made Cooke's Cañon and the Miembres Mountains memorable in the annals of New Mexican massacres.

More than a century and a half ago, the Spaniards, as they passed northward in search of gold, discovered in these mountains vast deposits of copper ore, much of which was virgin copper, so pure that it could be hammered out into plates as it came from the mine. At this place, known as the Santa

Rita Copper Mines,* they carried on mining for many years, and, as the ruins of a large prison bear testimony, obliged the natives by main force to work the mines as their slaves. As in other places, so it happened here, the white men were swept from the soil, and all mining ceased. When the gold mines in California were discovered, and parties of emigrants commenced to cross the continent on their way thither, many chose the southern route by the 32nd parallel; and after

Fort Cummings and Cooke's Peak.

Cooke had made two successful trips, had explored the pass which now bears his name, and had shown that water could be obtained at certain places all the way to California, this route gained favour. Cooke's emigrant road, however, is dreadfully roundabout; and the sufferings of the emigrants,

* The Santa Rita Copper Mines are forty-one miles from Fort Cummings, *viâ* Ojo Caliente and Fort Bayard, ninety-five from Fort Craig direct, and 110 miles from Mesilla.

from want of water and the loss of their stock, might well form a subject for one of Mayne Reid's novels. This passing to and fro of a mining population naturally led to the re-opening of the Santa Rita mines, situated as they are close to the line of travel. Much valuable machinery was put up here at an immense expense, together with the most improved method for obtaining the blast. All around the neighbouring mountain sides other rich discoveries were made. In 1861, the Hanover Mines, six miles to the north, were discovered, and furnaces were there erected. The ore occurs ramifying through decomposing felspar, sometimes from 50 to 60 feet thick, and gave on analysis 72·64 of oxide, or 58 per cent. of metallic copper. A little to the south-west, the San José mines were also discovered, and, in the same year, the gold mines of Pinos Altos. The region in which all these mines lie is more than 6,000 feet above the sea level. I will give the discovery of the latter place, and the desolation which followed, in the words of General Carlton, who visited it before we arrived in the district.

"In May, 1860, a Colonel Snively and a party of Californian miners came to this region, and discovered gold near the present site of the town of Pinos Altos, in what is known as Rich Gulch. In June of that year people commenced coming to work in 'placers.' In December, 1860, there were, say, 1,500 here from Chihuahua, Sonora, Texas, and from California. They at the same time 'averaged to the hand' some ten or fifteen dollars per day. Other gulches were discovered during the fall and summer of 1860. In December, 1860, the first quartz mine was discovered by Mr. Thomas Mastin with a party of prospectors. This vein is called the Pacific; it runs through the hill, or mountain

rather, which constitutes the divide of the continent, and has been worked on each slope of that mountain.

"In the spring of 1861 this mine was bought by Mr. Virgil Mastin, a brother of the discoverer, and it was successfully worked during the rest of the year. During 1861 the Apache Indians made formidable raids on the stock of the miners, and nearly stripped them of the means to prosecute their labours. A severe battle was fought between the miners and a band of this tribe, under Mangas Coloradas and Cachees. The Indians numbered about five hundred warriors, and came directly into the town now known as Pinos Altos, which the miners had established at a point central to the scene of their labours. This was on the 27th of September, 1861. Thomas Mastin, who commanded a company of volunteers, was killed in this fight. The Indians were driven off, but the impression they had made on the minds of the inhabitants of the town was so great as to frighten most of the latter away. The breaking out also of the rebellion had the effect of inducing many to leave. A few only held on, and amongst them was Mr. Virgil Mastin, who foresaw the future development of the great wealth of this region.

"Not much was done in discovering or in testing the merits of new veins from 1861 to 1864, when still another attempt was made to work the Pacific Mine, and a few other mines which Mr. Virgil Mastin had in the meantime discovered. These latter lodes are known as the Atlantic, Adriatic, and Bear Creek. The work commenced on these was prosecuted but a short time, when the Apaches again came and stripped the miners of their stock. This caused another suspension of labour until 1866, when Mr. Virgil Mastin and others organised a company under the name of

'The Pinos Altos Mining Company,' under charter granted by the Legislature of New Mexico. This company has three lodes, viz., the Pacific, Atlantic, and Bear Creek, and it now has a steam mill in the town of Pinos Altos (June, 1867) which drives three batteries of five stamps each. When all three batteries are kept at work night and day, they crush twenty tons of ore in twenty-four hours. The average yield of ore extracted from the Pacific Mine is from eighty to one hundred and fifty dollars per ton. Ore can be selected from the lode, which will yield one thousand dollars per ton. There are now within a radius of six miles from the centre of the town of Pinos Altos over six hundred lodes of gold and silver, as I have been informed by good authority.

"The population in October, 1866, at the time of renewing operations by the Pinos Altos Mining Company, did not exceed sixty miners. They now numbered from eight hundred to one thousand, and have erected, and are now building, some very comfortable dwelling-houses, and some very commodious stores at Pinos Altos. It is my opinion that before six years shall have passed away there will be a town at or near this place larger than Denver, for it may be doubted if there is on the known surface of the earth an equal number of square miles on which may be found so many rich and extensive veins, both of the useful and the precious metals, as at and near Pinos Altos, New Mexico."*

The history of the Pinos Altos miners is the history of all the others in the neighbourhood. In 1862 an act of treachery was committed by the troops which brought the

* "New Mexico" (a pamphlet), by Charles P. Clever, Delegate from New Mexico, 1868.

Indian hostilities to a climax. Mangas Coloradas, who was the greatest chief in the whole country, was induced to enter a military post, now abolished—Fort M'Lane, twenty miles west of the Rio Miembres—on the plea of making a treaty and receiving presents. The soldiers, however, imprisoned him in a hut, and the sentry shot him at night, on the excuse that he feared he would escape. This act roused the whole Apache tribe to vengeance. The Miembres Apaches, the especial band of the massacred chief, spread themselves far and near all over the country, and every white man they could find was doomed to fall by their silent arrows.

Cooke's Cañon, then traversed almost daily, was one of their favourite spots, and it is said that as many as four hundred emigrants, soldiers and Mexicans, have lost their lives in that short four-mile gorge. I have conversed with a settler who has counted nine skeletons while passing through the cañon, and the graves and heaps of stones which now fringe the road will long bear record of those dreadful times. The breaking out of the civil war caused the withdrawal of many troops who garrisoned the collections of mud huts, dignified by the name of forts, which were scattered up and down the country; so that the miners were left at the mercy of the red men; travel was completely stopped; the bright spark of enterprise which had just burst into flame was, for the second time since the discovery of the country, actually snuffed out; the mines and machinery were abandoned; the villages left in ruins; and thus the land relapsed once more into its original solitude.

Again the wave is turning in favour of the white man and settlement. Fort Cummings, a charming little fort enclosed in a square palisade, now protects Cooke's Cañon. Fort Bayard, situated almost equidistant between Pinos Altos, Santa Rita,

and the Hanover Mines, is well garrisoned, and many other posts have been either reopened or newly established. The Apaches have learnt in most places that resistance is hopeless; and while constant warfare ever tends to lessen their numbers, they cease to increase in anything like the same proportion; game becomes scarcer and scarcer; and as they do not cultivate the soil, they now confine themselves to "running off" stock, and to murdering any white man who, unprepared or alone, may fall into their power.

Having surveyed Palmer's Pass, the whole party moved forward across the plain drained by the Rio Miembres, towards the next great obstacle which barred our westward progress—the Burro Mountains. As the general direction of Palmer's Pass is not west, but very nearly north-west, we came upon the plain on the western side of the mountains, some sixteen miles north of the western end of Cooke's Cañon.

After three and a half miles travel, a cañada, or little valley covered with dry grass, took us, in four and a half miles more, straight down to the banks of the river, the descent in the nine miles being 573 feet. This bright and sparkling stream, filled with trout and beautifully shaded with cotton-woods and sycamore trees, appeared to our eyes perfection, for clear liquid water rippling over a pebble bed is a very rare sight in these regions. Yet, as I rode through the little stream, about up to my horse's knees, and disturbed the wild ducks and widgeon which were here very abundant, I could not help smiling as I thought of the bubble company by which some "smart" Western speculators had made this spot memorable. These men thought they would found a city here. They bought the land—I do not know whether they ever saw it or not—and forthwith issued

circulars soliciting investments in town lots upon this magnificent site. Drawings were made of the noble city, in which might be seen, besides the endless rows of lofty buildings, shady avenues, and the broad majestic river, *docks*, and a *steamboat*. These last items were unfortunate, for, in the first place, the Great Rio Miembres has got a very capricious habit of disappearing and reappearing, one might say at pleasure; and in the second, even if it were to flow uninterruptedly for many miles below the "city," it would only be found to empty itself in a small lake, the Laguna de Guzman in Chihuahua, which has no communication with the sea.

Six miles below our camp on the stream is a little Mexican settlement of some three hundred people. This had been abandoned for years on account of the Indians, but in 1865 it was again reinhabited. It is the only "city" as yet to be found on the Rio Miembres. Much fine bottom-land skirts the stream from the village to its source, hardly any of which is cultivated. Many curious natural ruins are to be found near the western bank. There are the valley of rocks, the city of rocks, &c., in which huge masses of sandstone form pillars, chimneys, altars, giant mushrooms, and temples which would compare not unfavourably with Stonehenge, had they not been geological curiosities only. I enjoyed a few hours' photographing amongst these grotesque forms, for they made splendid subjects for the camera.

Six miles beyond the river is a fine hot spring, Ojo Caliente, the second met with on our route. It issues from a mound which rises some 50 feet above the level plain; it is some 12 feet deep, and about the same in diameter, and looks very like the crater of an extinct volcano, although the mound may have been formed by the incrustations of lime

Vincent Brooks Day & Son, Lith

THE CITY OF ROCKS, RIO MIEMBRES.

deposited for ages from the water. Carbonic acid gas bubbles up continually from the bottom, and the more the bubbles the hotter the water becomes. The temperature, when I visited it, was 127° Fahr. Nitrate of silver produced no precipitate; evaporation, no perceptible residue; and as the water is tasteless and gives no odour of sulphur, I conclude that it is of unusual purity, though not medicinal in any way. I kept an egg in the crater all night, but it was still uncooked in the

Ojo Caliente.

morning; the spring is, however, a little too hot for bathing, and would scald any one unfortunate enough to slip into it. Some future hog-raiser will doubtless find it useful. Three hot and smoking streams trickle down from the mound through gaps in its side, one of which is conducted into a bath-house, composed of seven rooms. This hydropathic establishment belongs to Mr. Virgil Mastin, father of the

chief proprietor in the Pinos Altos Mines. He lives here with his wife and daughter, and has made his house celebrated for its well-filled table and delicious dairy produce. I almost blush with shame when I think of the amount of true animal enjoyment which half-a-dozen "square meals" gave me at Ojo Caliente. My readers, however, who have travelled long in the wilds, and lived month after month on anything that would satisfy the desire for food, will, I am sure, forgive this gluttony.

The garden, irrigated from the hot spring, supplied the table with fresh vegetables, amongst which tomatoes and the delicate Gumbo pod (for our hosts were Southerners, and had brought it from the land of cotton) were most worthy of notice. The butter was faultless, and told as much for the richness of its pasturage as for the skill of the fair daughter of our host. A housekeeper, either in London or New York, would decidedly object to the price—two dollars a pound. The *neighbours* at Fort Cummings (thirty miles) and at Mesilla (seventy-five miles) were, however, very willing to give it. Mr. Mastin is waiting patiently for the development of the country, when he feels no doubt that he will become a rich man. He has several springs on his property, besides Ojo Caliente, around which he can irrigate a good deal of very productive soil. The grazing is unlimited, and, curious to relate, the Indians have not as yet "run off" any of his stock.

Colton here rejoined our party, and found in my tent a hearty welcome and a vacant space. He had gone from Fort Craig down to La Mesilla to procure guides, during which trip he traversed the "Jornada del Muerto," or journey of death, as the road across the arid plain which lies at the back of the Sierra del Caballo is called by the Mexicans. In a distance of eighty miles permanent water is only once

found. Jornadas, or long stretches of country without water, form the greatest difficulty, next to the Indians, which beset the path of the traveller and emigrant, and they become more and more frequent until California is reached. Year after year, however, these jornadas are cut down in length by the discovery of springs or better-watered routes, or by digging out and enlarging transient water-holes, so that a sufficient supply can be retained in them, after the rains, to last during the intervening droughts.

Two guides had been engaged by Colton; both were Americans—one for each party. We could not hope for a better one than Juan Arrolles, who was still with us; but Colton having heard that a prospector, named Simpson, had passed through the largest and most difficult gorge on our proposed line of survey—the Aravaypa Cañon—thought himself fortunate in being able to engage him, for very few had ever entered that defile. It was *considered* as dangerous as it was *known* to be difficult, and even the most experienced of Western travellers laughed at the idea of our attempting to force our way through it, or survey it for a railroad.

CHAPTER III.

THE BURRO MOUNTAINS, THE MADRE PLATEAU, FORT BOWIE, AND WHAT HAPPENED THERE.

Hot Spring (Lemon Spring).—Large Cactus Groves abounding in Game.—No Water.—We discover Water at the foot of the Burro Mountains.—Deceptive appearance of this Range when seen from a distance.—Grand View from the Summit.—Examination of a Pass through the Range.—It proves unfit for a Railroad.—Abandon the Line.—Soldier's Farewell.—The Madre Plateau.—Barney Station.—The Water-hole and those who drink at it.—The Mirage.—Fresh Arrivals.—Mr. Runk's Party.—Result of Survey from Fort Craig to Barney Station.—Stean's Pass (Peloncello Range).—A Moonlight March.—Fifty-seven Miles without Water.—Cienega de San Simon.—How the Mails are carried through a Hostile Indian Country.—The Chiricahui Mountains.—Cachees and his Warriors.—Apache Pass.—Fort Bowie.—The Surprise.—The Pursuit.—Comrades missing.—The Search.—Another March by Moonlight.—The Graveyard amongst the Mountains.

Distance, 108 miles.

On Friday, October 25th, we left Ojo Caliente, and came, in less than three miles, to a very fine spring, which bubbled up vigorously from the ground in a little basin surrounded by lofty cotton-wood trees. The water, however, was hot, but not so hot as that we had left. Here we camped while a reconnoissance was made in advance to discover water and to direct the course of the survey; for we had followed neither road nor trail since leaving the Rio Grande. In the evening the little party returned, and reported open country ahead, but no water, at least for twenty miles, the distance they had been. It was, however, determined to fill up the water-kegs, eight in number, each holding ten gallons, and to push forward

to some willows and cotton-wood trees about eighteen miles distant, where we hoped by digging to find a spring.

At sunrise next morning (Saturday) we started, traversing a slightly undulating plain, covered, as far as the eye could reach, with the most magnificent pasturage. For five miles, as we followed a dry valley or trough in the plain, our route passed through a continuous grove of cactus plants, averaging from 10 to 20 feet in height. Here and there a yucca plant, or "Spanish bayonet," shot up its lofty stems amongst the cacti, adding very much to the grotesqueness of this curious vegetation. The cactus groves were as thickly stocked with the Gila quail, really a species of grouse, as a moor in Scotland with its feathered game of a similar kind. Enormous coveys of thirty or forty brace rose up on each side as we passed, and ran along in front of our horses.

On reaching the willows, no amount of digging produced a drop of water; so after trying several places, both up and down the dry bed of a stream, we were obliged to put up with a dry camp. The poor horses, as usual in such a plight, looked the picture of misery after their dusty march, and seemed to ask with their eyes, "Why are we forgotten?" We chained up the mules with extra care, and let them kick away to their hearts' content, and make the night hideous with a chorus from their seventy dry throats.

Sunday, throughout the expedition, was generally kept as a day of rest; but this was an anxious one to us, for besides the mules, we had forty horses and five oxen, and scarcely water enough for cooking and drinking purposes. I joined the water-hunters at daybreak, and, armed with spades and picks, as well as our carbines and "six-shooters," we directed our course towards the Burro Mountains, the next obstacle to the westward. We had, in fact, nearly crossed the plain between

Cooke's Range and these mountains, and soon entered a ravine leading up to them. After ascending for seven miles, we were gladdened by the sight of a little water trickling over some rocks. The first glance satisfied me that all was right, and in a few minutes holes were dug in the dry bed, which quickly filled with good spring water.

The water question being thus satisfactorily decided, a messenger was sent back for the whole party, while we continued our ride for the purpose of exploring the mountains, and of finding a cañon supposed to cut through them near our point of junction. We had received very conflicting reports about this range (the Burro Mountains). At a distance of some twenty or thirty miles it does not appear an imposing obstacle, for it seems to consist of three mountain masses, united by two long low ridges; but on approaching these ridges they turned out really to be only long undulations of the plain, which hide from view very rough and formidable mountains behind them. Our first surprise occurred when, on reaching the top of the ridge, we found the real mountains still in front of us. We pressed on, however, and after a few hours' more riding the crest of the main range was gained, and one of the grandest panoramas I have ever seen was disclosed to us on all sides.

To the south lay numerous isolated ranges and peaks, whose names we did not know, stretching far into old Mexico, and rising out of the great Madre Plateau, which lay between us and them like lofty rock islands from a motionless sea. To the south-east the graceful Florida Mountains retained their usual outline, while far beyond them the curious peaks of the Organ Range, whose fluted basaltic columns justly suggest the name, were distinctly visible near the horizon, although situated east of the Rio Grande more than a hundred miles

distant from us. Due east of us lay the range we had left, with Cooke's Peak rising nobly from its centre, and the exit of our pass (Palmer's Pass) distinctly visible. Still following the circle towards the north, the confused mass of the Miembres Mountains came into view; then those of the Santa Rita and Pinos Altos, semi-detached portions of the same. Quite to the north, twenty or thirty miles distant, some very high snow-capped mountains were conspicuous, forming part of that great system of mountains—the Mogollon Ranges, north of the Rio Gila, the home of the blood-thirsty Apache—which has never yet been explored.

The summit upon which we stood was, in fact, the dividing ridge of the North American continent; the little water-course at our feet was the first we had reached which flowed down the slopes leading to the Pacific; and the broad arid plains which lay between us and our next obstacle to the westward gave a most extensive forecast of our future course. Nearly forty miles of almost complete desert, with little chance of a drop of water, formed the undulating plain between us and the Peloncello Mountains. To the south-east a secondary range, called from its conical peaks the Pyramid Range, filled up a part of the centre of this vast tract. Our field of vision did not even end with the Peloncello Mountains, for Juan Arrolles, our guide, pointed out in the dim horizon, far beyond them, the rounded peak of Mount Graham, and the two sharp heads of the Dos Cabezas, the most prominent landmarks in the Pina-leña Range, and the boundaries on each side of Rail-road Pass. These ranges all lay far below us; they evidently rose from a much lower level, and seemed to show, even to the eye, that the ground sloped rapidly down towards the west. So extensive a panorama as that which I have attempted, however feebly, to describe, could never be witnessed in

Europe, or in any country where the atmosphere is much impregnated with moisture. For more than one hundred miles in almost every direction, nothing seemed to limit the extent of our vision but the incapability of our eyes to distinguish objects which were rendered too small by their remoteness.

Our guide knew the cañon we were in search of, and brought us next day directly to its head. It was not by any means a gap in the range, but only a large and well-defined gorge on the western sides. We followed it down to the plain. Two miles from the summit a large spring of clear cold water flowed from beneath a perpendicular mass of rock and formed a stream, which we followed until the cañon, cut out by it, became so narrow and so filled up with rocks and vegetation that we were obliged to bear away to the right and strike it again lower down. The stream had disappeared in the interval, and the cañon from this point gradually widened out, lost its fertility, and entered the plain as a dry open valley, trending towards the Gilas, scarcely twenty miles distant. The length of this cañon, from its head above the spring to its entrance as a cañada or valley on the plain is about thirteen miles. For half its course many large and beautiful trees adorn the path, amongst which we recognised sycamore, a very beautiful species of evergreen oak much resembling holly, a black walnut (*Juglans Whippleana*), rough-barked cedar (*Juniperus pachyderma*), pines, piñons, acacia, cypress, mezquit (*Algarobia glandulosa*), plum, and several species of cactus. An Indian trail led through the entire length of the cañon, including the two miles of very narrow gorge, and also over the hill, avoiding it, which latter route we adopted. It was evident from the recent pony tracks that the red men still used it, and were probably

well acquainted with all our movements. Other signs were recognised by our guide, such as bunches of grass tied up and made to point in particular directions, and were looked upon as conclusive evidence of the activity and watchfulness of our hidden, but probably ever-present, enemies. Game was abundant: two kinds of quail, black and white-tailed deer, bears, beavers, squirrels, and hares innumerable. Extensive fires had burnt down the bushes and laid bare large tracts of land all along the base of the mountains.

While taking advantage of the delay, which the difficulties of the country necessitated, to enjoy a little deer-stalking and grouse-shooting, Lieutenant Lawson (who commanded our escort) and myself were attracted during our rambles by a curious wall of rock which fringed, like a trap-dyke, the summit of a rather lofty range of foot-hills. On reaching the top we found that it consisted of a thick stratum of marble, which had been tilted up vertically to the height of from 7 to 20 feet above the ground, and that it extended for miles both ways along the hill-tops. This wall was beautifully variegated with white, grey, and red marbles, and presented the finest as well as the most singular exposure of the kind I have ever seen. In many places through the mountains we found quartz ledges, giving good indications of gold; and near the marble wall a vein of galena cropped out, of considerable width. Over this vein I shot a new and beautiful species of mountain grouse.

Four days were occupied in trying to find a good pass through the range, but our efforts were useless. We found, after surveying to the summit of the ridge which skirted the base of the mountains, that it was 1,208 feet higher than Ojo Caliente, twenty-three miles distant, and that the average grade for the last three miles had exceeded 160 feet per

mile, and this, too, before the mountains themselves had been reached. These Burro Mountains were not, as they appeared to be, an ordinary range rising from the plain, but the crowning ridge or summit of the great continental water-partings; and, although they rose from a much higher base than the ranges to the east and west of them, the slope up to their sides was not rapid enough at first to be distinctly apparent without the aid of our surveyors' levels. Nothing remained for us, therefore, but to abandon the line which we had been surveying, and to pass round the southern extremity of the range, twenty miles distant, by the great Madre Plateau, in which level district Mr. Runk's party was then at work.

A march of seventeen miles parallel to the mountains brought us to Soldier's Farewell, a solitary ruin which was once a station on the mail route during the short time it was established along the 32nd parallel. Two miserable water-holes are the great sources of attraction in this place. We feared they might be empty, as it was the end of the driest season of the year, but a shower of rain early that morning had providentially filled them partly up again. While we looked at the thick green puddle, full of creeping things, slime, and all sorts of abominations, from which we had to drink, a feeling of dread for the future involuntarily crept over us.

Oct. 31.

The whole country had changed, for we had at last entered that vast plateau upon the 32nd parallel which had so long been considered the only practicable highway for a railway route across the continent. The Madre Plateau is a vast plain, extending from the Rio Grande on the east for 3° westward, and separating the Rocky Mountains from those of Mexico. How thoroughly I pity the lover of the beautiful in nature who is obliged to traverse this fright-

ful plain from El Paso on the Rio Grande to Apache Pass! Although the mountains were still close to us, the landscape was as dreary as could well be conceived. At the bottom of a hollow caused by some broken ground lay the two putrid water-holes or ponds, overlooked by the tumble-down walls of a coralle and ranche. Before us extended an endless parched-up waste; some places were covered with poor grass, others were perfectly bare, and as the wind swept over them, clouds of dust were driven along or whirled up into the air like pillars of smoke.

From Soldier's Farewell we marched westward to the next water-hole, "Barney Station" (twenty-one miles), also an uninhabited ruin like that we had left, and, if anything, more dreary. There were no mountains near it, the land looked a dead level on every side, and not far distant towards the south lay what the Mexicans call a huge "playa," or dry lake. Over such a tract you may travel fifty miles in a straight line without crossing a water-course. When it rains the water collects in whatever part of the almost mathematically level flat happens to be slightly depressed, and here often covers many square miles of land to the depth of a foot, or even less. In such places even the scanty grass of the desert will not grow, and the whole earth becomes covered, as soon as the rain-water has evaporated, with a hard white shining crust, resembling cracked china, thus forming a "playa."

The water-hole here (Barney Station) was even more disgusting than those we had left, for it served to water, not only the men and stock of the "bull-trains" and troops which passed through the country, but all the wild animals dwelling within a radius of many miles. Flocks of birds, large and small, kept going and coming all day long. It

was a beautiful sight to see them all swoop down together like a sheet of feathers, flutter for an instant over the pool, and then flit away. At sunset might be seen at a great distance a V-shaped figure approaching from the clouds: this would be a flock of ducks, geese, or teal, coming for their evening bath. Unhappy stags and herds of antelope would stealthily approach, and, not liking the look of the intruders, make off again. Not so the wolves and coyotes; these fellows seemed to suffer frightfully from thirst, for after we had been camped for a few hours they would become so bold, or rather so eager for water, that neither the whiz of our bullets about their ears nor the crack of our rifles could keep them away from the pool.

The extraordinary vividness of the "mirage" is one of the great peculiarities of this region. We recognised it often on the plains of Western Kansas and elsewhere, but it is not seen to perfection until the Madre Plateau is reached. Half an hour after sunrise is usually the best time to watch for it; then the distant mountains become distorted into the most grotesque and fairy forms. Magnified to many times their natural size, they appear lifted into the sky, and are there cut up, sometimes horizontally, sometimes vertically, by the peculiar magical haze which surrounds everything. Often they look like terraced citadels; sometimes the phantasm takes a pillared form, and presents to the eye ruined temples like those of Greece or Egypt. This is not only the case with the mountains, for at a little distance everything appears distorted; the horses are changed into giraffes, the tents become elongated into snow-capped peaks, while the tufts of grass and the meagre scrubby vegetation are transformed into noble forests of gigantic trees; every little "playa" becomes a beautiful lake, from the waters of which are seen reflected

the magic transformations into which all surrounding objects have been changed. So complete is the delusion, that I have often remarked to a companion, as we watched the horsemen ahead of us dashing through the midst of a phantom lake, in which waves, shadows, spray, and sunlight were all portrayed to perfection, "How is it possible thus to disbelieve one's senses in broad daylight?"

Barney Station is 4,211 feet above the sea, which is about the average height of the entire plateau. During the two days' march from our camp at the foot of the mountains we had descended 2,000 feet.

The sun was setting, and I was just taking a striking picture of desolation, or rather a photograph of Barney Station in ruins, when two strange objects appeared in sight. The one developed as it approached into a most dilapidated and old-fashioned coach, the other into an equally shaky spring-cart, and both were drawn by mules; two ladies occupied the former and half-a-dozen armed soldiers the latter vehicle. The gentlemen of the party, four in number, rode on each side of the coach, and completed the travelling "outfit."

Between the Rio Gila and the Mexican boundary, Arizona boasts of possessing one town, Tucson, on the Santa Cruz River, now, I believe, the capital of the territory. This was the destination of one of the fair travellers, a very pretty girl of sixteen, in whose veins the fiery blood of Spain had been softened, but not obliterated, by union with that of our own; she was returning with her father, an American, having just completed her education at St. Louis. Her companion was on her way to join her husband at Fort Bowie, and to share with him the anxieties and solitude of a post which guards the most dangerous pass in Arizona—Apache Pass. We

shall presently get a glimpse of what such a life is. It is easy to fancy what extreme pleasure the presence of our fair friends gave us. They were just entering the most dangerous part of their journey, where defiles had to be passed through, in which half-a-dozen soldiers and four civilians were a very insufficient escort, so that we were delighted to render them the protection which increase of numbers afforded.

On the afternoon of November 2nd, Mr. Runk's party came in sight, and completed their survey up to our camp that evening. Since parting from us a month ago they had met with open country, and no obstacle but Cooke's Cañon, through which their route lay. The Apaches had succeeded in driving off half their oxen, but beyond this all had gone well with them. Altogether we mustered a large party at Barney Station, and notwithstanding the mud puddle of which we thankfully drank, and the dreariness of the place, we managed to make ourselves exceedingly jolly. A little whiskey was discovered amongst "somebody's luggage;" the fatted calf, our best bullock, was killed and cooked; and many good stories and bold adventures were told around the camp fires.

Nov. 2.

A few figures will give the result of Mr. Runk's survey :—

	Miles.	Elevations. Feet.
Fort Craig (on Rio Grande)		4,349
Fort Craig to Fort Cummings (foot of Cooke's Cañon)	104·1	4,585
Summit of Cooke's Cañon	3·1	4,876
Foot of ditto	3·6	4,518
Continental divide (Madre Plateau at the foot of Burro Mountains)	36·0	4,944
Barney Station	22·0	4,210
Total from Fort Craig to Barney Station	168·8	

After leaving the Rio Grande his party had found the country

weird and desolate in the highest degree, and very similar to that last described.

Next morning, Lieutenant Lawson, commanding the escort, started with nine of our men and some empty wagons to Fort Bowie for rations and forage; and our new friends, with Colton and myself, completed the party by joining him also.

For twenty-one miles we traversed the level plateau, and then entered the next range of mountains—the Peloncello Range; halting a short distance within the pass leading through it, known as Stean's Pass. At this spot was situated the only spring to be met with on the road. It was, however, dry on the surface, and we had not time to deepen it. A beautiful conical mountain—Stean's Peak—forms a good landmark for this pass and spring. From Stean's Peak to Fort Bowie, in Apache Pass, leading through the next mountain range (the Chiricahui), the distance is thirty-six miles, without a drop of water, making in all a "jornada" of fifty-seven miles without one drinking station.

We rested until sunset at Stean's Peak, in order to avoid the heat of the day, and then started through the grandest part of the pass. The moon was almost at its full, the night was perfectly calm, and a liquid softness smiled upon everything. These mountains were infested with Indians; and the ladies were rather nervous, as now and then we passed through a narrow gorge, or under some lofty crag. To keep them in good heart, we sang songs and choruses, in which they soon joined; these were re-echoed again and again from side to side. The cavalry rode in front, and the wagons brought up the rear. Now and again the horses' hoofs would ring out and rattle over a bed of rocks; or the moon, obscured behind the mountain, would suddenly throw a flood of light over the white wagons and glistening rifles of our party.

The air had become very cool and refreshing, and the scenery for at least eight miles through the pass was so grand in its rugged barrenness, that, seen at such a time, it left an impression never to be forgotten.

The accompanying engraving, drawn by R. P. Leitch, is taken from two photographs which I made of the pass a few days later, and is so true to nature that it brings back the scene with wonderful vividness to my mind.

A march of five hours, at the rate of four miles an hour, brought us to the Cienega de San Simon, where, as the name Cienega implies, there is at some seasons of the year a small marsh, with a little stream running through it. We found, as we had expected, no signs whatever of water, but plenty of good grass; so here we made our midnight halt.

Before daybreak next morning our fires were rekindled, and our coffee made, for we had carried wood with us from the pass; and before the sun had peeped over the eastern mountains we were again on our way.

Amongst the party was the mail contractor for this road. Twice a week a mail carrier rides from Tucson to Fort Bowie, 106 miles; another then carries the mails on to Soldier's Farewell, eighty-six miles; where he meets the solitary mail carrier, who had come from La Mesilla, 129 miles to the eastward. The mail-bags are exchanged, and each returns the way he came. The men who thus pass unguarded backwards and forwards through a hostile Indian country require no small share of reckless bravery. Their pay is high, being 200 dollars in gold (or £40 a month). The contractor told me that a year never passed without one or more of his mail-carriers being "jumped" by the Indians, under which circumstances he always made a point of carrying the mails himself for a fortnight at least, over the very section of road upon

STEAN'S PASS BY MOONLIGHT.

which his man had been killed. He had never any difficulty afterwards in finding some one else sufficiently reckless to risk his life for the ordinary remuneration.

During the latter ten miles of our march most of the route lay through thick brushwood, composed of mezquit, greasewood (*Obione canescens*), two kinds of aloe, yucca, a very large species of prickly pear, and other cacti, besides many other kinds of thorny bushes, which formed an almost impenetrable thicket, very well adapted for an ambuscade. Here and there my companion pointed to spots where one or other of his mail-carriers had been killed, or where he himself had been "jumped," and related how he had escaped at this place by the speed of his horse, or at that by good service done by his revolver.

Many of his anecdotes were most exciting, yet there was no apparent tendency towards exaggeration; while, on the other hand, he openly avowed that the more you have to do with Indian warfare, the more you dread the Indians, and try to keep out of their way. "Men may be very brave at first, but the continual anxiety soon takes the dash out of them—you bet!" and this avowal came from a man of undoubted courage.

On reaching the mountains at the entrance of Apache Pass, he pointed to a foot-hill on the right, and gave me a little sketch of the Chiricahui Apaches during his residence on the spot.

Until the winter of 1861-62 the Apaches of that range (Chiricahui Mountains) had not shown any very determined hostility to the Americans, and the mail company, for the two years during which they ran coaches along this route, kept on good terms with them, by giving occasional presents of blankets and food. At the breaking out of the

rebellion, however, an upstart Federal officer, named Barkett, was sent to take charge of this part of the country, and soon after his arrival at the entrance of Apache Pass, where he formed his camp, some Mexicans applied to him about a boy of theirs, whom they suspected had been stolen by the Apaches. Barkett summoned the chief, Cachees, and his head men to the camp. Being on friendly terms with the troops, the red men immediately responded to the summons. Cachees and his six men, however, positively denied the charge of kidnapping the boy; upon which orders for their arrest were immediately given. Cachees in a moment slit open the canvas of the tent with his scalping-knife, and escaped; his companions were all secured. A man named Wallace, who had long lived on the most amicable terms with the tribe, volunteered to go alone and treat with them. He did so, and sent back a message to Barkett that, in his opinion, the boy had not been stolen by them, but added that he himself was retained as a hostage in their hands. Barkett became furious, and swore that he would hang the red men if the boy was not returned that night; and he kept his word. On the heights to the left, those half-dozen savages were strung up next morning; and, shocking to relate, poor Wallace, who had trusted so implicitly to the personal affection shown for him by the red-skins, was immediately hanged on the summit of the heights on the opposite side of the pass. This tragedy over, Cachees and his entire band fled back once again to their mountain fastnesses, never more to come in contact with the white man, unless in the execution of their unquenchable revenge.

Fort Bowie is situated about six miles up the pass. It consists of a small collection of adobe houses, built on the summit of a hill, which rises as a natural look-out station in

the centre of the defile, and commands the road both ways for two or three miles of its length. The only officers at the time of our visit were Lieutenant Carrol, Lieutenant Hubbard, and the resident surgeon; the only troops, one small company of forty men. The officers insisted upon Lawson, Colton, and myself sharing their quarters; they had not had a visitor of any kind for months, and had almost forgotten that the world was inhabited.

After luncheon I strolled out upon a higher hill-top to choose a good position for taking a photograph of the fort and pass. The view was a very beautiful one, for we were hemmed in on all sides by lofty mountains, the most conspicuous of which is Helen's Dome. Some two miles distant in the pass, the sheep and oxen belonging to the fort were peacefully grazing, when suddenly I perceived a commotion amongst the garrison. All were hurrying to the highest part and looking towards the cattle, from which direction I heard a few shots fired. It appeared on inquiry that the mail-carrier, going west to Tucson, had only gone on his way a short distance past the cattle, just beyond the turning in the road which hid him from the fort, when he suddenly came upon two Indians who were stealthily creeping up towards the stock. Shots were exchanged, and he immediately turned back to give the alarm to the men guarding the cattle, and to the sentinels at the fort. The Indians showed themselves two or three times in the open, and then disappeared. It was useless for us, with our wearied horses, to join in the chase after a couple of naked red men, so we remained behind.

So poorly supplied was this little fort, if such a term may be applied to a collection of mud huts, that two horses represented the entire stock. It was customary to keep one of

them with the herd and the other in the stable, and the favourite chestnut of the lieutenant's, a high-mettled, splendid creature, happened this day to be at home. It was immediately saddled. Carrol was quite young; he had only seen eighteen summers, and looked even younger, for his hair was very fair, and he had not the least tinge of whisker on his smooth cheeks. I remember watching him spring with one bound from the ground into his saddle, wave his hand merrily to us, and then dash down the steep winding road which led from the fort to the pass below. Again we saw him racing as fast as the horse could gallop along the pass after the mail-carrier, who, being previously mounted, had started off with the infantry. I went back to my photography, for there were many views I wished to obtain; but my friend, Lieutenant Lawson, could not remain long inactive. He was a great character. Although very short, quite grey with years, and not in the least like a military man, he was the gamest little fellow I ever met. So fond of soldiering did he become during the war, that he could not settle down again to business. Though one of the steadiest of men, and a religious man also, a great rarity out West, he actually left his good wife and family comfortably settled at Cincinnati, changed his social position from wholesale hardware merchant and ex-colonel of volunteers to simple lieutenant in the regular army, and started to join a Western regiment. The merest chance of a brush with the Indians was irresistible; so he ordered out his six men and their six jaded horses, and off they went down the winding road, and then away out of sight along the pass.

As the afternoon went by, most of the infantry returned by twos and threes, and we were just sitting down to dinner when Lieutenant Lawson and his men rode into the fort.

Vincent Brooks, Day & Son, lith.

ATALAYE PASS FROM FORT PAWNEE

They had hunted about all over the mountains and through the ravines, but had encountered no savages, nor even caught a glimpse of a red-skin. Carrol, to our surprise, was not with them. We made inquiries, and found that all had reported themselves except the lieutenant and the mail-carrier. We questioned those who had gone the farthest, and a shepherd just back from over the hills; these agreed that they had heard the distant report of fire-arms, coming apparently from the western plain. This was the direction the two red-skins had taken. So we saddled our horses without a moment's delay, and, with sickening forebodings in our hearts, started across the mountains to the western plain. We scrambled up the base of Helen's Dome, which was so steep as almost to baffle our horses, well trained as they were to all sorts of bad places; then, after skirting the side for some distance, we crossed a ravine to another mountain slope, down which we plunged, over large blocks of limestone and marble, leading our horses by the bridles, and clambering through them as best we could. Every moment was precious, for the sun had almost set before we reached the plain.

Then we spread out in line, nine in number; for there was no enemy in sight, and our only hope was to strike the trail; for we knew they must have passed somewhere in this direction. Every eye was fixed on the ground, every blade of grass was closely scanned; our souls were in our eyes. At last one marked "pony tracks;" then another called out, "This way they lead;" not two, three, or four tracks, but many; perhaps a dozen. The white men had evidently followed too far in pursuit, and falling into an ambuscade, had been cut off from their comrades. Most of the hoof-prints were naked, but two sets were shod. These were certainly those of the missing horses. We could not hurry on very

rapidly without losing the trails, and yet there was not half an hour's daylight. For three miles farther we pressed on, carefully tracking our way. We passed a spot much trampled down and blood-stained. Here the poor fellows had made a stand; had probably tried to cut their way back through their enemies, who were driving them from the fort. A little further, and all hope of one life was gone. The mail-carrier lay stretched upon the open plain—scalped, naked, and mutilated—in the setting sun. This poor man wore whiskers, and the savages produced even a more startling effect than usual by scalping one of them. Thus half of the face was stripped of skin, and the bleeding muscles were laid bare.

We could not stop a moment; but, dragging up two huge magay plants to mark the spot, we followed the pony tracks. The sun sank, and it was only by the red glare thrown up from behind the horizon, and reflected by the bare mountains of rock to the east of us, that we were able to track our way. So difficult was it at last that we began to despair of ever learning the fate of poor Carrol. We longed to see his dead body; for the idea of his being taken alive to be tortured and roasted over a slow fire, whilst the fiends danced round him, and exulted over his agony, was the one dread consummation which made our blood run cold. No one spoke, for we all knew well that such would be his fate if that sun had not shone upon his corpse.

As we took a last searching look over the dimly-lighted plain in front of us, we saw an object move slightly on the grass. We quickly rode towards it, and in half a mile further we found that it was the faithful dog of the lieutenant. He was guarding the stiff and lifeless body of his master. So we wrapped the naked body in a saddle-cloth, and tied it on a horse.

But for the moon, we should not have found the spot where the mail-carrier lay. We placed him also on another horse, and then turned our faces towards the pass. The wolves were already gathering round the spot, and the night winds were blowing up cold and chill. The night before, that same beautiful moon which now shone peacefully down upon us, had lighted us through the noble gorge in the Peloncello Mountains, while we sang choruses and enjoyed the grandeur of the scene. This night she lighted us through another gorge, in another range of mountains—Apache Pass—but how different were our feelings as slowly we marched in mournful silence over the nine miles which led up to the fort! Thus ended the 5th of November.

Next morning we buried the poor fellows in the little graveyard amongst the mountains. The doctor read the burial service, and Lieutenant Hubbard, Colton, Lawson, and myself were the chief mourners. When the final volley had been fired over our two poor comrades, and I turned to glance at the tablets of their companions, I read on the wooden crosses over every grave but one, the same sad story of their fate—

"Killed by the Apaches."

When Cachees' six best warriors were wantonly hanged five years before, that bold chieftain vowed that for every one of his lost comrades a hundred white men should die by the hands of himself and his band. Two more scalps were thus added to the long strings of those which already hung from the belts of the Chiricahui braves.

CHAPTER IV.

FROM APACHE PASS TO THE ARAVAYPA CAÑON.

Return to Eicholtz's Party at Stean's Pass, and all proceed thence to Railroad Pass in the Chiricahui Mountains.—The Valle de Sauz.—A Curious Mirage.—The Physical Geography of our Route through Southern Arizona.—Railroad Pass.—Change of Escort.—Join Runk's Party and conduct them to Railroad Pass.—A Ride of sixty miles, and the Incidents on the way.—The Cañada of the Aravaypa.

Total distance, 211 miles.

LEAVING our disconsolate friends to their solitude, we retraced our steps with supplies to the foot of Stean's Peak, where we found our party encamped, and the surveyors at work along the pass. This pass through the Peloncello Range, however, proving unfit for a railroad, we did not remain to complete its survey, but started next morning for the Chiricahui Range. The Puerto del Dato, or Apache Pass, was known without doubt to be impracticable; but about twenty miles north of it lay a depression in the mountains, with so gradual an ascent and descent that it received the name of Railroad Pass from its discoverer, Lieutenant Parkes.

Nov. 6.

So after a few hours' photographing in Stean's Pass, taking a special view of "El Pecacho de Santa Lola," a lofty peak christened by us in honour of the young lady we had escorted to Fort Bowie—who, by-the-bye, had to cross the fatal ground the day after the catastrophe just related, on her way to Tucson—I proceeded with the rest towards Rail-

road Pass. Our route was a perfectly straight one; direction, 10° south of west, across the flat Valle de Sauz; the distance from pass to pass being forty-six miles, odometer measurement. No water was to be found on the way, but we had no difficulty in making the distance in two days with one dry camp. As for the Rio de Sauz, I have been unable to find it anywhere but on the map, although I have crossed the valley five times in different places. A river *ought* to flow through a valley thirty miles wide and 120 long, but with the exception of an occasional dry water-course of most insignificant dimensions, trending in a north-west direction towards the Rio Gila, I could discover no evidence of one. Even when we had reached Railroad Pass we did not find water without considerable difficulty, so that instead of camping in the pass itself, we were obliged to follow a dry water-course for six miles, until we reached a spring issuing from the side of the lofty Dos Cabezas (two heads).

Our guide, Juan Arrolles, while following up this arroyo, was fired at by some Apaches from the summit of a hill overlooking the spring. Although we galloped up immediately on hearing the shots, we could not find a trace of the savages.

I must not forget to mention a very curious mirage which Mr. Eicholtz and myself observed early in the morning, as we were approaching Railroad Pass. We were watching the gap in the mountains, for which we were making, when we observed between it and us a perpendicular cliff, in which the horizontal strata of the rocks were most distinctly visible. We were greatly disappointed; Mr. Eicholtz was almost alarmed; for if this was Railroad Pass, the easy slopes of whose sides had been so much extolled, there must be some mis-statement. Looking round, however, we noticed that

this perpendicular cliff not only extended across Railroad Pass, but formed the base of the mountains in front of us. We looked back, and there it was also, in exactly the same relative position at the foot of the range we had left the day before. Then the real nature of the illusion became manifest, for we had not climbed down any such obstacle; had it been a reality, we could not have overcome it without letting down the wagons and cattle by ropes; our dreaded barrier must therefore be a myth. And so it was, for in half an hour the cliffs had disappeared, and behold! a sloping grass-covered plain alone stretched out before us.

Let us pause for a moment at Railroad Pass, so as briefly to review the physical geography of the country over which we have so rapidly travelled, and to take a prospective glance at our future course.

The most northerly pass westward out of the Rio Grande Basin, practicable for a railroad, we found to be Palmer's Pass, through Cooke's Range, the most southern spur of the Miembres Mountains. Some eight miles south of Palmer's Pass, Cooke's Cañon was found to be practicable with a tunnel; but both passes could be avoided by going only six miles further to the south, and passing around the end of the range in the Madre Plateau.

The second range of mountains encountered was the Burro Mountains, along which runs the main divide of the continent. We found that it was impossible to build a railroad through these mountains, but there was no difficulty in passing south of them in the great plateau. I have spoken of passing out of the Rio Grande Basin, across Cooke's Range, and of crossing the continental divide to the Pacific slope over the Burro Mountains; I have not, however, stated where the drainage of the intermediate district goes to. The plain between these

ranges, limited on the north by the Miembres Mountains, forms part of the basin of the Laguna de Guzman, in Chihuahua, towards which, as I have before remarked, the Rio Miembres flows. The vast plain, the continuation northwards of the Madre Plateau, lying between the Burro Mountains and the Peloncello Range, is not inaptly called the Valle de los Playas, for playas are common all over it, while water-courses are few. The Rio Gila, and the mountains on the opposite side of that river, limit it on the north.

The minor upheaval, the Pyramid Range, may be called the third range encountered. Mr. Eicholtz's party passed around its northern extremity; Mr. Runk found Lightendorfer's well road an easy and practicable route through it.

Next comes the Peloncello, or fourth range. This is a fine range, but abounding in passes. The most northerly is Doubtful Pass; eight miles south is Stean's Pass; twelve miles lower, Runk's Pass; then comes the pass through which Lightendorfer's road leads to the Cienega de Sauz; and lastly, thirty miles still further south, Cooke's emigrant road passes through the range. Stean's Pass Mr. Eicholtz found impracticable, but that discovered and adopted by Mr. Runk answered every requirement for a railroad.

Having crossed the Valle de Sauz, however, we encounter the first range (Range No. 5) of that extensive cordillera which appears to stretch northward to the plateau of the Colorado beyond the 35th parallel, and to be continuous southward with the Sierra Madre of Mexico proper. The general trend of the ranges forming it is, like most of those in this part of the continent, north-west by south-east. Exactly in front of our course westward, the cordillera consists of three parallel ranges; the Pina-leño and the Chiricahui forming the first continuous range, the Sierra Calitro

the middle, and the Sierra de la Santa Catarina the outer or most westerly. Between these ranges are two troughs: the eastern trough is called the Valley of the Aravaypa, north of Railroad Pass; south of that pass it goes by name of Sulphur Spring Valley. The western trough consists of the long narrow valley of the Rio San Pedro. Both these troughs were explored, and as no practicable pass could be found through the first of these ranges but Railroad Pass, and as that one was unusually good in every respect, this entrance into the first trough was made use of by both parties. From this point the parties again separated, the one under Mr. Eicholtz to follow down the first trough, through the stupendous gorge, the Aravaypa Cañon—a narrow passage cut by nature through the middle range—into the San Pedro valley to Camp Grant, a point sixteen miles from the junction of that river with the Rio Gila; the second party, under Mr. Runk, to deflect southward from Railroad Pass, to cut through the middle range (Sierra Calitro) by Nugent's Pass, and to follow down the San Pedro valley to the same point—Camp Grant —where the Aravaypa and Rio San Pedro unite.

One may naturally ask, How does the Rio Gila, in its course from east to west, make its way through the cordillera? This river strikes the mountains almost at right angles, and passes through them in a succession of cañons, three in number, varying, as far as has yet been ascertained, from twelve to twenty-five miles each in length.

At Camp Grant we are still in one of the troughs (the San Pedro valley) between the mountains; one range more still bars the way, and there are three routes by which it is possible to escape. The first and most northerly is by following the Rio San Pedro down to the Rio Gila, and then passing westward along the latter stream through its last cañon, twelve

miles long; the second is to cross the mountains by a natural pass almost due west of Camp Grant, over which a road leads to Sacaton, on the Gila; and the third way is to cross by another pass seventy miles to the south, which leads from the San Pedro crossing (a good ford about latitude 32° 5′), *viâ* Cienega de los Pimas, to Tucson.

The ranges of the cordillera crossed, there are no more mountains of any magnitude to be found between them and the Sierra Nevada of California. The whole of the intervening country on this parallel is parched, worthless, and nearly all desert.

After this digression, let us carry our minds back again to camp at the spring in Railroad Pass, and continue the narrative of our daily life.

Mr. Eicholtz recommenced his survey at a fine cotton-wood tree, a conspicuous landmark 14·33 miles east of the summit of the pass. From this point the twin peaks of the Dos Cabezas appeared to great advantage. The mountain itself forms the southern boundary of the pass, and the northern end of the Chiricahui Range. Opposite the Dos Cabezas, and forming the northern boundary of the pass, is another fine mass, named Mount Graham, which is the southern extremity of that continuation of the range northward called by another name, the Pina-leña Mountains. The length of the pass is fourteen miles—seven up and seven down; its width averages from eight to ten miles. It looks more like a plain which has been slightly uplifted than a pass through a range of mountains, covered as it is with magnificent grass, and devoid of trees. It is grooved in its centre by a broad, smooth, grass-covered arroyo, which commences as the dry bed of a little stream near the summit. A wagon-trail, known as Leache's Old Road, traverses it; but when we

passed over it, this road did not appear to have been used for years.

Looking westward, straight through the pass, a very abrupt wall of mountains is seen exactly in front. This is the first view obtained of the Sierra Calitro.

In crossing the Peloncello Range, forty miles in our rear, we had passed the boundary-line between New Mexico and Arizona, and had entered the military district of California. A messenger arrived at our camp from Fort Bowie on the 11th, with orders for Lieutenant Lawson to proceed to the Cienega de Sauz with his detachment of cavalry, in order to meet those escorting Mr. Runk, so that they might both be relieved at that point by a company of Californian troops sent there for the purpose. We were very sorry to lose Lieutenant Lawson, whose age and experience we appreciated so much, and whose firmness and kindness towards his men kept those wild fellows perfectly under command. This change of troops, however, gave me an opportunity of joining Mr. Runk's party, and of guiding them direct to the spot where they were to unite their line with that of Mr. Eicholtz.

On Tuesday, the 12th, we marched to Fort Bowie—twenty-four miles; and on Thursday joined Mr. Runk's party at the Cienega. By Saturday at sunset, with great exertions on the part of the surveyors, who were actually at work each morning at sunrise, we completed the line to Railroad Pass, and camped that night on the old camping-ground, which had been vacated three days previously by Mr. Eicholtz. Many square miles of the plain passed over were covered with mezquit bushes, which had to be cleared away, in order to adjust the levels, &c., thus causing considerable delay. In many places there was an abundance of good grass, while

some parts were quite bare, and no signs of water were anywhere to be met with.

The result of the survey from Barney Station was the following:—

	Miles.	Elevation. Feet.
Barney Station		4,210
Summit of Pyramid Range	8·2	4,610·5
Eastern foot of Runk's Pass (Peloncello Range)	12·3	4,174
Summit of Runk's Pass	3·9	4,166
Eastern foot of Railroad Pass	38·9	4,035
Summit of ditto	6·9	4,411
Total distance from Barney Station to Railroad Pass	70·2	

The object of my visit to Mr. Runk and his pleasant party having been accomplished, I started next morning with two cavalry men to catch up my own party, which I expected to overtake either spending the Sunday at Kenedy's Spring, thirty miles down the Aravaypa valley, or, if the ground proved rough, at Bear Spring, a few miles nearer.

Nov. 17.

As we followed the wake of the wagons, we remarked numerous tracks, which could not have been made by any of our party. These were the footprints of at least a dozen pair of moccasins, besides the unshod tracks of many ponies, and all had been made since our party had passed over the ground. Could a band of Apaches be closely following our men in the rear, prepared to take advantage of the slightest opportunity for murder or plunder? If so, how could we, only three in number, manage to run the gauntlet? These were our thoughts as, mile after mile, all through the day we followed the mysterious trails. There could be no doubt of the presence of Indians all through these mountains; for if we had not had so melancholy a proof of that fact at Fort

Bowie, we had passed no less than four well-worn Indian trails, which crossed different parts of Railroad Pass, from one part of the range to the other. This was, in fact, the highway leading from the Sierra Blanca and other mountain fastnesses north of the Gila, to the State of Sonora, where those sons of plunder were wont, ever since the strong military rule of Spain had ceased, to make constant raids upon the helpless Mexicans.

About seven miles from the summit of Railroad Pass we crossed a large playa, about three miles wide, and two miles further on we passed the remains of one dry camp. The valley was very level, and for the most part covered with fine grass, but not a trace of a central river-bed was to be seen. We kept close to the base of the Calitro Range, because most of the springs lay on that side, and by half-past five the few cotton-wood trees which mark the situation of Bear Spring came in sight. On arriving there, we found by the wagon tracks that they had not halted; so on we rode without a moment's delay, but did not reach Kenedy's Spring until the night had overtaken us. All was silent there also. After two hours' more riding we decided upon a halt, to rest our horses and get a snatch of sleep. We struck a match and examined the track. There were the pony and moccasin tracks as visible as ever; so, for precaution, we went a little way off the road before we lay down to rest.

Clouds in the meantime had covered the sky, and as luck would have it, it actually rained. A shower had fallen three weeks before in the Burro Mountains, but that was all we had had for two months. Cold, hungry, and wet, neither rest nor sleep was possible, so we soon saddled up again, and went on our way. It was so dark that the road made by our dozen wagons, like all other

objects, was quite invisible, so that we were obliged to leave it to the horses to keep the track, which they did apparently without difficulty. Hour after hour passed away, and on we rode in the pitch darkness. By the help of a match we again examined the trail, and again discovered that even since the rain had fallen, while in fact we were resting, two pair of fresh moccasins had "made tracks" over the road. Was it possible that we also were being followed?

The moon rose and the clouds broke a little, so that now and then a glimpse was gained of the world around. On each side towered up a mountain range; between them lay the flat, monotonous plain. At last we came to a sudden depression or groove in the centre of the valley; the land had sunk from beneath, and formed a second little valley at the bottom of the first. This was the commencement of the cañada of the Aravaypa. We descended into it, and followed along the dry, grass-covered bottom until the sides had assumed the magnitude of bluffs. The ground became more fertile; brushwood, and even willows, grew in places; and soon a well-defined water-course could be made out running along one side of us.

Suddenly, about three o'clock in the morning, there appeared close before us out of the darkness a white tent and a smouldering camp fire. Thinking that our camp had been at last reached, I trotted briskly forward, calling out "Friend!" so as to warn the sentinel and prevent his firing at us. But to my surprise I found myself in the middle of a motley group of brigand-looking fellows, who started up in the greatest consternation, and pointed their long rifles at us. They had sense enough, however, to see that we were not red men, and we soon discovered them to be a band of Mexicans. On their feet were the moccasins which had caused us so much anxiety, and not far off stood the ponies, whose unshod

hoofs had completed the deception. Mutual explanations as to who we were quickly followed. We warmed ourselves by their camp fire, and gladly accepted from them some hot coffee and a loaf of bread.

The circumstances which had brought these Mexicans to such a place as this are easily explained. They had come all the way from Toas, east of the Rio Grande, a party of twenty, and being bound for Southern California, had taken the 32nd parallel route. Although not acquainted with the country, they had made their way very well by following the mail-road until they reached Stean's Pass. But here they found two roads, one going to Fort Bowie, and the other, well marked by our wagons, leading to Railroad Pass. This latter they had taken, and, once on our trail, they had followed it up to this point. They did not know where they were, but felt quite sure that so well-marked a trail must lead to California. Daylight soon came, and brought to view two American prospectors, who had joined the Mexicans for mutual protection. The goods and chattels of the party consisted mostly of buffalo robes, and were carried on the backs of mules and ponies, sixteen of which formed their entire stock. As we considered that such a reinforcement, tolerably well armed as they appeared to be for Mexicans, would be a great addition to our own party, we advised them not to return, as they had come so far from the overland route, but to push through the Aravaypa Cañon in company with us. This course they agreed to adopt.

Again we mounted our weary horses, and left Eureka Spring, which was warm and sulphurous, and neither fit for man nor beast. Ten miles further we rode before the shouts of the surveying party told us that our long weary journey was drawing to a close. About this point (ten miles from

Eureka Spring) we encountered a large spring, which bubbled up from the ground in the centre of the cañada; from it flowed a perennial stream of considerable volume, whose life-giving waters filled the valley below this point with thick luxuriant vegetation.

At last, when camp was reached, after a continuous ride of sixty miles from nine o'clock one morning until eleven o'clock the next day, and we dashed through the rivulet into the thick grove of cotton-woods which hid the tents from view, no small amount of anxiety was lifted from our minds. My readers can hardly appreciate what pleasure it was to see once more around me trees and flowers, to listen to the song of birds, the rippling of waters, and the subdued rustling of the leaves overhead; it seemed that the deserts had all been crossed, and that danger was but a dream.

A slightly elevated piece of ground at the back of our camp was covered with the stone foundations of many buildings, large and small. The divisions of the rooms and entrances could plainly be made out. Much broken pottery, such as the Pueblo Indians make, was picked up amongst the ruins; but no trace of recent occupation could be discovered. "Los Alamos Grandes" is the name we gave to this spot. It is only six miles and a half from the entrance of the cañon, which distance we travelled on the day following my arrival at camp.

With the help of the results attained by our surveyors, I can give a tolerably accurate account of the physical features of the trough between the mountains in which we have been travelling. I retain the word trough, in preference to valley, for reasons to be soon explained. After descending from Rail-road Pass to the centre of the trough (six and a half miles), and on changing our course towards the north-west, we do not continue to descend; but, on the contrary, in the first

twenty-two miles we rise again some 200 feet. At abou this point we cross a divide, and commence the real descen towards the Rio Gila; or, in other words, we enter the basin o the Aravaypa. This fact is soon made manifest by the appear ance of the cañada of the Aravaypa as a groove at the botton of the trough between the mountains. From the commence ment of this cañada to the point where its walls approximat so closely as to form the cañon proper the distance is 25·3(miles, in which interval the total descent is 1,104 feet.

As this great fall does not represent the slope of the trough between the mountains, but the gradual deepening of the groove in its centre (the cañada of the Aravaypa), it is easy to understand how the cliffs or sides of the cañada become higher and higher as we descend. Sometimes they approach each other, and form a natural gate or narrow passage for the river bed. Sometimes they recede to the distance of two or three miles apart. In places they have perpendicular walls. Often they become sloping banks, and being composed of soft, friable material, mostly drift, they are sometimes transformed by erosion into very picturesque objects, resembling forts, castles, long lines of earthwork, and the like, which are chiefly remarkable for the mathematical regularity of their outlines, thus giving a very peculiar appearance to the whole country, since the traveller is never out of sight of these singular formations; for no sooner is one passed than another appears at the next turning of the gorge. At the back rise the black shining walls and the deeply-serrated summits of the volcanic ranges on either side. These gradually approach each other until the trough itself becomes obliterated, and the walls of the cañada in its centre are of necessity merged into the mountain sides. At the point where the mountains seem to unite, the cañon proper begins.

Vincent Brooks Day & Son lith

THE CANADA OF THE ARAVAIPA.

CHAPTER V.

THE ARAVAYPA CAÑON.

Preparations to advance through the Gorge.—A glimpse at the Country above.—Formation of the Walls.—First Night in the Cañon.—Difficulties of the Surveyors.—Remains found by us after a Massacre in the Cañon.—The Gorge increases in grandeur as we advance.—Animal Life.—The Vegetation.—Photographing.—The Surprise.—The Cañon becomes very narrow and tortuous, and the Perpendicular Walls exceed 1,000 feet.—A Change in the Rocks and Plants.—The *Cereus giganteus* and other Cacti.—Our Camps in the Cañon, and how the Evenings were spent.—Indian War-songs.—End of the Cañon.—Indian Trails and Apache Wigwams.—Reach Camp Grant.—Colton and I leave for the South.

Distance, 34 miles.

Nov. 19.

Camp having been pitched at the entrance of the cañon, a party was formed to make a preliminary examination of it, and to determine whether our wagons could be taken through or not. Two cavalry men were also despatched, with a guide, to Fort Goodwin, fifty miles distant—at the other side of the Pina-leña Range—to obtain, if possible, a few more troops; for our escort had been cut down, by the change of command, from thirty men with everything necessary for campaigning, to fifteen men destitute almost of everything. These matters having been settled, Stuart, our quarter-master, and myself started over the mountains upon two good mules, in order to obtain a view of the defile from above, and to study the general lie of the country. The scenery was wild and utterly desolate beyond the little narrow streak of beautiful vegetation which filled the gorge and the cañada leading to it. Not a tree was to be seen,

nor a single patch of green. The country seemed to consist of a succession of mesas, piled up one above the other, like terraced mountains, presenting from five to a dozen parapets. Volcanic force considerably assisted in producing the wild confusion which surrounded us; for many of the summits were formed of pointed masses of plutonic rocks which had been forced up from below, while considerable areas of surface had been covered with a thick coating of lava, the broken edges of which shone out smooth and black in the sunlight. The most prominent mass in the landscape—called, from its shape, Saddle Mountain—is probably an extinct volcano. It stands exactly in front of the trough between the mountains which we had left, and seems to be the chief obstruction which prevented the Aravaypa River from continuing its direct course into the Rio Gila, and obliged it to deviate from north-west to south-west; for looking over the dreary landscape in the latter direction, the rugged outline of the mesa country seemed to us less obstructed by formidable barriers on that side; while at our feet we could trace for miles the black cleft in the earth's crust which we knew to be the Aravaypa Cañon. With a good deal of climbing, we managed to enter a side gorge which debouched upon the main cañon, and by following its windings at last entered the latter about three and a half miles from its head, and then followed its course to camp, fully persuaded that if the cañon itself was impracticable for wagons, no way could be found through the country above it. A rapid exploration of a very few miles of the cañon proper was sufficient to prove that it would only add greatly to our difficulties to attempt to take our wagons with us.

On the third day the party from Fort Goodwin returned, bringing us some extra mules, pack-saddles, and thirty in-

fantry; so, having packed our provisions and other necessaries upon the mules, we severed our connection with the wagons, and commenced our journey through the gorge. The wagons, escorted by the infantry from Fort Goodwin, were obliged to retrace their steps and to travel southward to Nugent's Pass, through which they were able to turn westward into the San Pedro valley, and to follow it down to Camp Grant. *They* had to travel 150 miles to reach that point, whereas *we* were only thirty-four miles distant from it at the head of the cañon.

Nov. 22.

Never shall I forget the six days and five nights we spent in cutting our way through this wonderful defile; and, though the remembrance of it cannot but be a vivid one, I feel that it is quite impossible to give anything like a fair description of it.

Guarding the narrow entrance rises a conic hill, to which we gave the name of "Look-out Mountain," for it commands a very extensive view both into the cañon and up the cañada, in the opposite direction; furthermore, it is most probable that when this country was inhabited it was used for that purpose, for the stone foundations of a building which formerly covered the summit are still distinctly visible. Close under this hill a very large spring gushes out of the ground, the waters of which more than double in size the Aravaypa stream. Without this large permanent supply of running water the cañon could probably never have been formed.

For the first two miles the walls are perpendicular on one side, and sloping on the other; the former do not exceed 500 feet in height; but at the end of that distance a large triangular mass juts up from the centre of the ravine, which seemed to us to bar all further progress. The stream, however, had

managed to twine around it, and by following in its bed we succeeded in doing so too.

From this point the walls on both sides are perpendicular. They are formed for the first few miles of conglomerate alone, which is horizontally stratified; in fact, drift washed down by primeval waves from the mountain's side. But as the

Our First Camping Ground.

gradual fall of the stream bed, which is on an average 50 feet per mile, brought us deeper into the earth, we reached the sandstones, and gradually passed through them to the hard granite beneath.

Luxuriant vegetation fills up the space between the walls; the undergrowth consists of willows, young trees, bunch grass, reeds, &c., forming in many places an impenetrable thicket; and above them a succession of noble trees tower

up towards the sky, as if striving to gain a glimpse of the upper world. Under a grove of the loftiest cotton-woods and sycamores, at a distance of four miles from the head of the cañon, we threw down our blankets for the first night's rest. Not far distant, a few deserted Indian wigwams were visible, perched upon the top of the cliff, which painfully reminded us of danger. The setting sun beautifully illuminated three Norman watch-towers, which some freak of nature had carved out upon the precipice that rose above our grove of trees.

The obstacles our surveyors had to contend against naturally made our progress very slow, not more than from two and a half to three miles per day being cleared; for a path had to be cut through the brushwood which choked up the narrow passage, and every tree obstructing the vision of the levellers had to be felled. The Mexicans whom we had picked up were of great assistance to us. We hired six of their animals for pack mules, and several of the men to help as axe-men in cutting a path through the thickets. I obtained a mule for my photographic "outfit," and was thus enabled to take a number of views of the gorge. During the second day's advance we came to a cave, hollowed out in the northern wall, capable of concealing about fifty men, and opposite this we picked up several Indian skulls and human bones. To these relics there hangs a tale.

In 1863 a company of Californian volunteers on their way eastward to fight the "rebs," and glad enough to get a little professional practice *en route*, joined in an expedition headed by a Captain Tidball, the object of which was to break up the chief rancheria of the Aravaypa Apaches, which was located on this spot. The citizens and soldiers, guided by some tamed Apaches who were kept at Camp Grant,

entered, as we did, the head of the cañon, and came upon the Indian village just as the evening was changing to night. They hid quietly until daybreak, and then attacked the savages with such effect, that out of seventy, who formed the band, but twelve escaped; all the rest were massacred—the women and children by the tamed Apaches, the warriors by the Americans. The fate of this band was not undeserved, for it had been the terror of the country round for a long time previously, and had committed many frightful atrocities upon the helpless Mexican and American settlers. These Apaches had carried on agriculture to some extent in the cañon, for we passed the remains of a few small irrigating canals in places where the space between the walls left a sufficient extent of bottom-land for such a purpose.

As we advanced, the cañon became more and more tortuous. Bold walls of rock often enclosed us in front and rear, as well as on either side; nor could we tell which way to turn until we had come close upon the apparently insurmountable barrier. Higher and higher towered the walls. For the first few miles they were flat and continuous from base to summit, although portions here and there stood out like huge needles or lofty spires from the main cliffs; but after attaining a certain height, the walls became divided into two, the upper portion of which seemed to lean a little back and to rise from the lower one, like a cliff springing from a cliff. The walls, in fact, became two stories high, and each story measured about 400 feet. The strata of the upper story or cliff continued, as before, to consist of conglomerate; but grey sandstone appeared at the base of the lower one, and gradually extended upwards. Caves and grottoes became very numerous, and every mile added to the grandeur of the chasm.

The stream had to be crossed over and over again—often at every hundred yards; and it was curious to see how active the little axe-men of nature, the beavers, had been, for many a wetting was saved by our men on foot being able to cross over the large trees which, having been felled by these little fellows, had fallen athwart the stream. Nor were beavers the only inhabitants. Deer came down to drink at the brook, but by what paths remained a mystery to us; quails and doves were very abundant in places; and birds with beautiful plumage—some bright red, others rich blue, and a third variety, a black and white kingfisher with a bright red crest—especially attracted our notice.

I was photographing with a companion one afternoon in the cañon, about half a mile in the rear of the surveyors, when suddenly a succession of shots ahead made us start up from our work. The gloomy grandeur of such a place was not good for the nerves; and we feared terribly an Indian attack, where the advantages of position were so much against us. Leaving the camera, black tent, and the rest to take care of themselves, we hastened towards the front. A horse, minus his rider, dashed rapidly past, which did not increase our confidence. On arriving, however, at the scene of action, we were not a little relieved on finding that a fine flock of turkeys had so tempted the foremost of our party, that, forgetful of the alarm they would cause, they had seized their rifles and fired at them. The explosion caused by even a single shot in such a chasm sounded like the report of a dozen cannon, so great was the reverberation, and so many the echoes which followed it.

About seven and a half miles from the entrance, the cañon becomes so narrow that it appears only as a cleft between the huge perpendicular walls which tower above us: there is no

space whatever on either side between the bed of the stream and the rocks, so that the only passage is in the river itself. The action of the water, moreover, has hollowed out the base of the southern wall-rock for from 20 to 30 feet of its thickness, so that we rode under the rock itself for some distance.

The first "narrows," as we called this passage, having been passed, we came to an open space of some fifteen acres, giving us a good camping ground and plenty of grass for the stock. This space is situated about the centre of the cañon, and is very beautiful, being filled with splendid timber, cotton-wood, sycamore, live oak, ash, willow, walnut, and grotesque old mezquits of most unusual size. Fine branches of mistletoe hung from many of the trees; we met no girls, however, on this occasion, but the laughter-loving parasite was a great surprise.

Just past this open space a great change takes place. In order, it would almost seem, that the traveller should not weary of the cold grey sandstone and conglomerate formations, the sombre tints and horizontal strata, large quantities of volcanic rock, with their smooth facets and their rich tints varying from purple and red to black, burst into view, and alter completely the appearance of the walls. A deep rich fringe of basaltic columns adorns the terraces on either side, and this lavaform coating is bright and shining; the edges are as sharp in outline as if cut with a knife, and produce fantastic forms in the shape of turrets, &c., quite different in appearance from those met with previously. Nor is the change to be seen only in the rocks—the vegetation immediately shows the difference of soil; and, identical in position with the new strata, appeared for the first time on our route the *Cereus giganteus*, the largest cactus with which botanists are

acquainted. Here these huge grooved columns thrust their thick trunks from between the crags, and rise up on all sides far above our heads to heights varying from the baby-plant to the forty-feet. They seem to require no earth; and in places the walls are covered with them to the very summit. The secondary columns shoot out from the central stem, and then turn upwards with studied regularity, forming a circle of

The Cereus giganteus.

four or six arms around the parent trunk. Besides the "Monumental Cactus," as it is sometimes called, large bushes of prickly pear, tufts of Spanish bayonet and magay, with other species of prickly plants, also find a genial abode up amongst the crags, producing a contrast most singular and striking between the grotesque spinous vegetation upon the walls and the graceful foliage in the narrow passage beneath.

A little further, the rocks on either side approach so closely as to obliterate for a second time the entire passage, and this time the bed of the stream alone remains between the walls for two miles and a half of its course. At this part the walls present another break in their perpendicular height, and appear to consist of three terraces or cliffs piled one above the other, each capped with basaltic columns; thus showing, as it appears to me, the real nature of the terraced form. Each cliff or terrace is, in fact, a land-slip into the gorge, the lowest terrace representing the part earliest detached; for as each terrace is covered with lavafo..n basalt, it is evident that at some time each ledge so covered must have formed part of the surface of the ground over which the lava had flowed.

Between the two "narrows" the cañon did not widen much, so that the lengthening shadows overtook us very early in the evening, and obliged the surveyors to cease from their work; and when the sun had left the upper world, and night had really come, the blackness of darkness around us was absolutely awful, and the stars, which covered the narrow streak of sky above, seemed to change the heavens into a zigzag belt, every inch of which was radiant with diamonds. Our camps, too, were very picturesque. The mezquit tree, with its tortuous stems, grows to an unusual size here, and as the wood makes magnificent fuel, we found the foot of one of them to be the best place to pass the night. Dotted about amongst the trees the cheerful blaze of a dozen fires would light up the branches and foliage, making the darkness visible, and giving us a glimpse now and then of the massive walls which towered up above us. We discovered an amusement for our long evenings quite in harmony with the place.

Amongst the party of Mexicans there was a tame Navajo

Vincent Brooks Day & Son Lith

THE ARAVAYPA CAÑON, SOUTHERN ARIZONA.

Indian, who had been captured by his present master some years ago. This savage had many accomplishments, and, amongst others, he knew the war songs and dances of many of the neighbouring tribes. He was very fond of our camp, for he seldom went away empty-handed; and when the fires were blazing up and a good circle had been formed for him, he would come and sing his war songs until far into the night. A different dance accompanied each chant; the music was very wild and plaintive—a dreary dirge in a minor key—at particular parts it became very slow and piano, then a quick movement usually followed, the dance corresponding with the music, until the climax was reached by a series of yells which made the whole cañon re-echo with unearthly sounds. Our oft-repeated applause had the effect of exciting the little fellow to such an extent that he usually kept it up until he was quite exhausted.

So melancholy were the intonations of all these curious chants, that they seemed to be the fitting funeral march of a people speedily and for ever passing away from their place amongst the nations of the earth.

Three-fourths of the cañon was traversed and surveyed in four days; the remaining fourth, however, presented the most formidable obstructions; for large masses of wall-rock had fallen into the narrow cleft in so many places, that no sooner had we succeeded in getting our mules and horses over one pile of *débris* than a fresh one lay across our path. We gradually entered, however, a more broken and open country, and gaps in the walls became proportionately frequent. Confusion seemed here to reign supreme; no longer did the abrupt walls hem us in, but large masses of rock, I may say sides of mountains, lay piled up all around. We measured one perpendicular cliff, which, from its position, was acces-

sible to our instruments: found it to be 825 feet high, and this was below the average of the walls; so it is easy to conceive the relative magnitude of the rest. From out of this chaos the cañon gradually emerged, widening out and approaching more to the extent and appearance of a narrow valley. The south side first began to break away with sloping bluffs, covered with cactus and stunted vegetation, while the north side continued perpendicular for three miles and a half beyond the second "narrows," where it joined a huge mountain of igneous formation, consisting of six basaltic terraces one above the other, which formed a fine landmark for miles around to show the position of the cañon. Beyond this are foot-hills on both sides for two miles more, when the cañon merges into the widening valley, which, some six miles further on, joins that of the Rio San Pedro just south of Camp Grant. In this valley nearly all the water of the Aravaypa sinks into the earth. I hear, in fact, from residents at the fort, that for many weeks during the year no surface-water whatever enters the Rio San Pedro from it, although in the cañon there is always a fine stream.

An Indian trail, which is easily followed in single file, except where the bed of the stream alone is left, or where the whole path is blocked up with *débris*, leads quite through the gorge. In the first part of the cañon there are at least five lateral means of exit through arroyos which enter it, one on the southern and four on the northern side, but there is no escape whatever for the rest of the way.

Some of our men in advance came one day across an Indian encampment, in which the ashes of a fire were still smoking, but nowhere did we see an Indian. Their wigwams were of very frequent occurrence during the last eight or ten miles, especially in the valley between the cañon and Camp Grant.

They all consisted of a round framework of sticks, tied together with grass on the top, and lined within and without with willow, grass, and weeds; a little space being left for the entrance.

It was evident, then, that we had frightened the Apaches out of their natural haunts. They feared perhaps another massacre; or they looked upon our instruments, which seemed to take up so much of our attention, as some infernal machines, intended to destroy them, had they given us a chance.

Be this as it may, we were glad enough to come above-ground again; for, apart from the oppressive feeling caused by such a place under any circumstances, the actual fact was always present in our minds, that our enemy from above could, almost at any moment, have completely annihilated our whole party. Had the Indians thought proper to hurl rocks down upon us as we passed through many parts of the passage, from which there was no possible escape or hiding-place, not one of us could have escaped to tell the tale of this adventure.

On Wednesday, the 26th, I arrived at Camp Grant, and two days afterwards the whole party reached it safely. This post consists, like all the others, of a collection of adobe houses and log-huts, with large covered verandahs to keep off the sun, for it is very hot here in the summer. The view from it over the country is a very peculiar one; for, although not a tree is to be seen on the hills which rise up on all sides, the *Cereus giganteus* takes their place. I have never seen it growing thickly, so as to hide a patch of ground from view, but everywhere these solitary pillars, with their encircling arms, are to be recognised, and as no other kind of vegetation is in the least conspicuous, they become the most prominent objects in the landscape.

Nov. 26.

The result of the survey from Railroad Pass to Camp Grant is the following:—

	Miles.	Feet above Tide-water.
Summit of Railroad Pass		4,411
Playa de los Pimas (centre of trough)	6·50	4,275
Head of Aravaypa Cañada	22·52	4,474
Eureka Spring	5·89	4,164
Head of Aravaypa Cañon	19·41	3,370
Leave high-walled cañon	14·49	2,645
Camp Grant	12·12	2,174
Total in miles	81·93	

The Rio San Pedro enters the Rio Gila 11·55 miles from Camp Grant, at an elevation of 1,911 feet above the sea.

The result of the survey from Railroad Pass, *viâ* Nugent's Pass up the San Pedro to Camp Grant (the route travelled by our wagons), is the following:—

	Miles.	Elevations.
Summit of Railroad Pass		4,411
Foot of slope west of Railroad Pass	5·8	4,206
,, east of Calitro Mountains	6·4	4,203
Summit of pass through Calitro Mountains	10·1	4,740
Mouth of cañon, Nugent's Pass	20·9	4,475
Surface-water of Rio San Pedro		3,390
,, ,,	41·3	2,662
,, ,, at Camp Grant	22·0	2,168
From Railroad Pass to Camp Grant *viâ* Nugent's Pass	106·5	

Average fall of the Rio San Pedro per mile 20·4 feet.

Colton and a small escort of cavalry came with me to Camp Grant. The second evening after our arrival the soldiers gave one of their fortnightly theatrical entertainments, which savoured much of nigger minstrelsy and burlesque Italian opera singing; and the next day after this pleasurable excitement, Colton and I bade good-bye to the officers and the one lady who were residing here, and directed our course southward.

Nov. 28.

After a few days' visit to Tucson, Colton returned to the surveyors on the Rio Gila. I passed on to Mexico. It is, therefore, with great pleasure that I invite my readers to travel with my much-esteemed companion and friend to the Pacific, before they join me in my trip through Sonora.

CHAPTER VI.

THE VALLEY OF THE RIO GILA, AND COUNTRY LYING BETWEEN THE RIO COLORADO OF THE WEST AND THE PACIFIC OCEAN.

CONTRIBUTED BY CAPTAIN WILLIAM F. COLTON.

The Rio Gila and its Tributaries.—The Plateaux beyond the Valley.—Cultivation in the Gila Valley.—Insufficiency of Rain-fall.—Great Heat of the Summer.—Navigation on the Rio Colorado.—Valleys along that River.—Pacific Cordilleras, the Sierra Nevada and Coast Ranges united.—San Diego Bay.—The Town.—Climate of San Diego the finest in America.—Southern California.

THE Gila River, rising in the Mogollon ranges of New Mexico, has a general westerly course, passing into and traversing the entire breadth of Arizona, and emptying into the Rio Colorado just opposite the boundary between California and Lower California. From the north if has numerous affluents breaking through a region frequently mountainous and always much broken, but with beautiful and fertile valleys well supplied with timber and animal life, and remarkable for the evidences of an ancient civilisation found in the ruins of well-built towns and extensive acequias constructed of cut stone.

From the south it receives but few branches, the Rio San Pedro being the most important. Below the mouth of the San Pedro, the valley of the Gila for a distance of twelve miles is open, and varies from one to two miles in width. The river then "cañons," and for about thirty miles winds its devious way between frowning cliffs and precipices. From the lower end of these cañons to its mouth the valley is open

and wide, with a regular and gradual descent of from 8 to 15 feet per mile.

Ascending the bluffs which mark the limits of the valley proper, we come upon a vast desert plain, dotted here and there with isolated mountains rising abruptly from the general level, and presenting sharp, serrated outlines against the clear, rainless sky. Almost entirely destitute of water, this region is a very uninviting one to the explorer, and but little is known of it save that its mountains are wonderfully rich in precious metals.

The great mail road from Tucson runs in a north-westerly direction, striking the Gila River at Sacaton, a mail station. Thence it follows down the river to Maricopa Wells, where the stream makes a great bend to the north, and does not strike it again till it reaches Gila Bend Station, from which point the road continues down the valley to Arizona City—a very small place with a very big name.

The soil in the valley of the Gila in many places is so strongly alkaline as to be unfit for agriculture; still there is an immense breadth of land susceptible of successful cultivation. Maize, barley, wheat, cotton, and all the vegetables of the temperate zone are already profitably cultivated by the few white settlers between the cañon and Sacaton, and by the Pima and Maricopa Indians between Sacaton and Maricopa Wells. Below the latter station there is no cultivation except in small gardens at some of the mail stations on the lower river.

Not reckoning its tributary valleys, the Gila valley has about 300,000 acres of arable land, capable of sustaining an agricultural and mining population of 200,000, which is, no doubt, a low estimate. During the same season the same land produces two crops, one of wheat and another of maize.

The breadth of land now under cultivation—in many places subject to the frequent incursions of the terrible Apaches—is quite small. Intelligent residents gave me the following estimate for Southern Arizona:—

ARABLE CULTIVATABLE LAND.

	Acres.
Valley of the Aravaypa	5,000
,, ,, San Pedro	50,000
,, ,, Santa Cruz	20,000
,, ,, Gila	300,000
,, ,, Salt River	50,000
,, ,, Colorado	15,000
Total	440,000

UNDER CULTIVATION.

	Acres.
Tres Alamos and vicinity	500
Calabasas ,, ,,	200
Tubac ,, ,,	500
Tomacacori ,, ,,	50
San Xavier del Bac	100
Tucson	2,000
Above Pimas Reservation, on Gila	1,000
Pima Reservation	1,000
Total	5,350

MAIZE AND WHEAT RAISED IN 1867.

		lbs.
Tres Alamos		500,000
Calabasas		200,000
Tubac		500,000
Tomacacori		50,000
San Xavier		50,000
Tucson		1,500,000
Gila River, above Reservation		1,000,000
Indian Reservation	wheat 750,000	
	maize 250,000	
		1,000,000
Total		4,800,000

That part of Southern Arizona lying east of a line drawn from Baboquivari Peak to the Gila above Sacaton possesses, in common with New Mexico, great pastoral advan-

tages. It is covered at all times of the year with a magnificent growth of grama grass—one of the most nutritious grasses known to stock-raisers; and at no season of the year do cattle need other shelter than that afforded by natural variations in the surface of the ground.

Timber is scarce. In the Santa Catarina and Santa Rita Mountains pine is abundant, but elsewhere, and then only upon the immediate banks of the streams, cotton-wood and mezquit alone are found to supply either timber or fuel. The latter is a remarkably hard and durable leguminous wood, and grows in the Lower Gila valley and in the Colorado to a size large enough for cross-ties, and not unfrequently attains a diameter of from 18 to 30 inches. It makes the most highly-prized pianoforte legs.

On the plains in the immediate vicinity of the valleys and west of the line referred to, bunch or gieta grass is abundant, and furnishes, in addition to the valley grasses, excellent grazing. The Pima and Maricopa Indians, as also the white and Mexican settlers on the Upper Gila, have large herds of cattle. Farther west, grass becomes very scarce, and gives place to grease-wood, wild sage, artemisia, and the numerous family of cacti, of which the *Cereus giganteus* is the most worthy of notice. A story is current that an American in Central Arizona has been known to climb these terrible fruit trees, but there are few who are credulous enough to put any faith in it; hence the Far-Western phrase, "Up a cactus tree!"

The excessive dryness of the atmosphere during the greater portion of the year has made these otherwise fertile plains a barren waste. During the months of July and August a few showers cool the heated traveller, and give a temporary freshness to the vegetation; and during the month of December one or two heavy rains may be expected, which

raise the streams, and sometimes flood portions of the valleys. At such times the Gila River, at the Pima villages, is from 50 to 75 yards wide and about 10 feet deep, while near its mouth it attains a width of 150 yards, with a depth of about 12 feet.

The summers are intensely hot, and the winters extremely mild. At Fort Yuma snow is unknown, and the meteorological record at the hospital shows the maximum and minimum temperature to be 116° and 34° Fahr. At Arizona City, on the east bank of the Colorado, and just opposite the fort, the mercury has been known to reach 126° in the shade.

Southern Arizona is wonderfully rich in silver ores, and, in common with Central Arizona, has immense deposits of the sulphites, carbonates, and oxides of copper. Gold is also found in quartz lodes and placers.

The Colorado River is now navigated to Calville, 612 miles above its mouth, and about 400 miles south-west of Salt Lake City. The stream is very uncertain in its character, having numerous sand-bars, with a shifting channel, which in places separates into smaller ones, none of which are readily navigable; but the light-draught steamers used in navigating this river, on reaching a place of this character, proceed to the most favourable channel, and force the sandy bed of the pseudo-channel with poles. These steamers never run at night.

The Colorado Steam Navigation Company have three steamers and three barges on the river—the *Colorado*, 70 tons; the *Cocopa*, 100 tons; and the *Mojave*, 70 tons; the barges, each, 100 tons; total, 540 tons. These vessels draw 1 foot light, and 2 feet when loaded. The trips are irregular, depending on the arrival of sailing vessels at the mouth of the river, where all freight is transferred to the barges.

Freight is carried at the following rates in coin :—

	Per measured Ton. Dollars.
San Francisco to Fort Yuma . . .	47·50
,, ,, La Paz	57·50
,, ,, Fort Mojave . . .	77·50

Lumber, from San Francisco to Fort Yuma, 60 dollars per 1,000 feet. Ore, as return freight, is carried from the Eureka Mines to San Francisco at 15 dollars per ton.

The valley of the Colorado is capable of sustaining a vast population. The large areas of arable land along the river are separated by cañons, and are known generally as Colorado Valley, Chemehuevis Valley, and Mojave Valley. Between these great valleys are many smaller ones, besides the vast tracts of land situated on either side of the river, below the mouth of the Gila. The bottoms are about four miles wide, subject nearly everywhere to overflow, and capable of raising the cereals, vegetables, cotton, and, I believe, below the Gila, sugar-cane. Vast quantities of cotton-wood, willow, and mezquit are found along the river banks and in the valleys. Cotton-wood and willow are used by the steamers for fuel, mezquit being rejected because of the rapidity with which it burns out the grates in the fire-boxes.

The following figures were taken from the meteorological record at Fort Yuma :—

	Inches.
Average fall of rain for 1857 . . .	0·33
,, ,, ,, 1858 . . .	8·57
,, ,, ,, 1866 . . .	4·20
,, ,, ,, 1867 . . .	2·94

At Arizona City is an excellent bridging point, the river being confined between rocky bluffs. Between these bluffs the river is but 472 feet wide, and from 12 to 37 feet deep, with a very rapid current.

Crossing the Rio Colorado here to Fort Yuma we find ourselves in the State of California, and but a short distance from the Mexican boundary. Perhaps a more uninviting point could not be selected at which to enter the far-famed State, whose name is synonymous with bullion. From the Rio Colorado to the Cordillera, or Great Range, stretches a weary desert, 100 miles in width. Traversing this desert, and crossing the Mexican boundary, is New River, whose waters (when it has any) run northward into vast shallow lakes. It is well known that a large part of the desert is below the level of high water in the Colorado, and as New River receives its water from the floods of the former, much of this land can be irrigated. Here the mirage is seen in great perfection, often deceiving the weary and thirsty traveller.

The eastern drainage of the Cordilleras is marked by rapidly-descending cañons, the waters from which find their way down the long slopes at the foot of the mountains to the desert, where they soon disappear in their dry sandy beds.

The foot-slopes of these mountains ascend from the desert by grades of from 50 to 150 feet per mile. Through these mountains are three passes, accessible for the Gila route, viz., Jacomba, Warner's, and San Gorgonia. The Jacomba, recommended by General W. S. Rosecranz, is the most southern, and almost on a direct line from Fort Yuma to San Diego. It would save about sixty miles over the route by Warner's Pass, but it is deemed impracticable for a railroad. Warner's Pass is practicable, but requires the maximum grade (116 feet) for several miles, with very heavy and expensive rock-work. San Gorgonia Pass is the best of the three, but too far to the northward to be used were San Diego to be the terminus. Considered with reference to the route by the 35th parallel, it would be its most direct outlet

to the nearest seaport—San Pedro. But if a trans-continental railway be built by the Gila route, it is highly probable that Warner's Pass would be selected.

Leaving the summit of Warner's Pass at the Felipe Ranche, we descend towards the Pacific coast through lovely valleys, in which large herds of cattle and horses graze throughout the year. Here, on vast estates held under Spanish titles, live the native Californians—wealthy in lands and cattle, unprogressive, and, until lately, much opposed to the American occupancy.

San Diego Bay has acquired great prominence in view of the construction of a southern railroad to the Pacific Ocean; but its few intelligent Americans are too sanguine of its early rise to grandeur and wealth. San Francisco, as the great commercial metropolis of the Pacific States, must be for a long time the great terminus of Pacific railways.

The Bay of San Diego is a perfect place of safety for vessels, and possesses an advantage over San Francisco Bay in that it is easy of access from the sea. Its entrance is protected from the strong westerly winds by a bold promontory, on which stands the lighthouse. It is not obstructed by a bar; it is but three-eighths of a mile wide, and never has less than five fathoms of water at low tide. In 1865, the steamer *Vanderbilt*, drawing 22½ feet, and loaded with coals, steamed into the bay, and discharged at the plaza. The bay has plenty of water, and good anchorage for vessels of the heaviest draught, and, if needed, could shelter the whole navy of the United States. The mean tides are 6½ feet, and the highest ever known, 12 feet. (See plan of harbour facing p. 370.)

San Diego, or "Old Town," as it is familiarly called, has a population of about five hundred souls, mostly natives, and lies at the northern end of the bay, just below the mouth

of the San Diego River, and, in consequence of the delta formed by the sands carried from the mountains by this stream, has no landing.

New Town, about two miles to the southward, with but three or four houses, has an excellent landing for coasting vessels; and to build wharves reaching into deep water would not be costly. The location of the town is excellent, the ground admirably adapted for building, and with ample room in the rear for a large city. There is great need, however, of good water, most of the water obtained in wells being slightly brackish; but a growing town could be easily supplied from a point on the San Diego River, about eighteen miles distant, where the water is perfectly pure and very abundant.

The business of the place is small. About 7,000 barrels of oil are annually produced from the Californian grey whale, which is caught along the coast, and towed to the shore to be "tried out." Some 2,000 head of cattle, a few horses, and a few hides find their way through the town from Lower California.

It has been asserted that the country at the back of San Diego is not capable of cultivation; but I cannot endorse this. I believe that, with the exception of part of the grain required for the sustenance of hundreds of thousands of population, the back country can produce everything needed, including a great excess of cattle and horses; for olives, oranges, limes, lemons, English walnuts, grapes, pomegranates, barley, wheat, and all the vegetables thrive well.

At the Old San Diego Mission, about six miles above the town, and on the river of the same name, are many thriving though aged olive and orange trees. I saw also at the Old Town two old date palms which were planted by the early

Jesuit missionaries. These trees give quite a tropical aspect to the scenery.

Besides its fine bay, the boast of San Diego is its climate, which for mildness and salubrity excels that of the most famous spots within our natural limits. By the meteorological record kept here when the place was a military station, the minimum temperature was 40°, and the maximum 82° Fahr. Frost and snow are of course unknown; and at all seasons of the year the mild, delightful sea-breeze sets in about ten o'clock in the morning. The death of a resident is looked upon as a remarkable event; and when I was introduced to the resident physician, his dilapidated appearance told plainly of a very small visiting list. "Why, sir," said he, leaning forward with his hands on his knees, and throwing an amount of earnestness into his dilated eyes which I cannot describe, "why, sir, a physician would starve to death if he depended on his practice for a living!"

I would here state that the San Diego River is every winter bringing down from the mountains a large quantity of sand, and depositing it in the bay just opposite its entrance, thereby gradually silting up that part of the harbour. This can be easily and cheaply remedied. Just north of the harbour is another basin—a false bay separated from it by a narrow flat; and it is proposed to direct the waters of the river into this hitherto useless basin.

Southern California, so far as it is yet known, and in the opinion of eminent geologists, is not rich in useful or precious minerals. Gold has been found in a few places, as also copper, but neither as yet pays for the labour bestowed upon it. Tin has been found near Temecula, but is believed to exist only in pockets.

Indications of coal were observed thirteen years ago on the

shore near San Diego by the Mormons, who sunk a shaft to a depth of 86½ feet. Veins of good coal were found, varying in thickness from 6 inches to 4½ feet, but during the next year Utah was invaded by the United States' troops, and Brigham Young ordered all the faithful to Salt Lake to defend the "Holy City." Thus the work was abandoned, and the shaft is now full of water. There seems to be no doubt that the coal can be used for commercial purposes.

From San Diego to Temecula, a distance of fifty-four and a half miles on the route to San Bernardino (at the western end of San Gorgonia Pass), the road bisects numerous streams and dividing ridges nearly at right angles, and presents an exceedingly rough profile; but from Temecula to San Bernardino—fifty-five miles—it traverses almost an unbroken plain. The streams crossed are, the San Diego, the Soledad, San Diegito, San Illejo, San Louis Rey, Temecula, San Jacinto, and Santa Anna. These streams are all full and strong, and most of them difficult to cross, by reason of quicksands; we were obliged to stop and lead our horses across them, for though the bottoms easily sustained the weight of man, they threatened to swamp the poor horses. Most of these valleys contain a great deal of arable and extremely fertile land, while on hills and in valleys the luxuriant grasses of California sustain immense herds of cattle and horses. Occasionally we would pass the "casas" of some wealthy ranchero, surrounded by orange groves and vineyards, and at several of them we were right hospitably entertained, and refreshed with the *vino del pais*.

From San Bernardino, which is a large and rapidly-increasing wine and fruit town, sixty miles brought us to Los Angeles, famed for its salubrious climate, its beautiful women, and its three thousand acres of vineyards, and twenty miles

more to the post of San Pedro, where Colonel Banning, the commander, dispenses his hospitality in a charming manner.

How we were entertained; how we tasted wines of various vintages; how we passed through San Fernando and Soledad Passes, to the Great Basin east of the mountains; how we skirted the eastern foot of the mountains to Tehachepa Pass; how General Palmer, with the parties from the 35th parallel, joined us there; how we exchanged our tales of adventure; how we traversed Tulare valley, where the wild flowers were in bloom and fragrant in December; how we clambered over the Coast Range at Pacheco Pass; how we passed through the beautiful valley of Santa Clara to San José; how we again rode behind a full-grown locomotive into San Francisco; how we all met safe and sound at last in the capacious hall of the Occidental Hotel; how heartily we commemorated that happy event; and how General Palmer, you, my dear Bell, and myself fared on our return trip by Salt Lake City, I must leave for others to relate.

CHAPTER VII.

SONORA.

Leave Camp Grant for the South.—Convalescent Camp.—Cañada del Oro.—Mezquit Forests.—Tucson.—Hunt for a Guide.—Van Alstine.—My Mule causes suspicion.—Routes into Sonora.—The Country.—The Papago Mission of St. Xavier del Bac.—Rio Santa Cruz.—Sopori Ranche.—A Girl carried off by the Apaches.—Mina Colorado.—Aravaca Valley and Enviguetta.—Obtain a fresh Mule.—Baboquivari Peak and the Zazabe Valley.—Papago Rancheria.—Hard travelling.—Lose our way.—Ranche on the Altar River.—The Midnight Massacre.—Robbers ahead.—Night travelling for safety.—Coffee.—Querobabi Ranche.—Tabique and its Inmates.—Change in Temperature and Vegetation.—Torreon amongst the Palms.—Opita Indian Girls.—Making Tortillas.—The Hacienda de la Labor.—Papagos in Petticoats.—A dangerous Wood.—Our Entrance into the Capital.

SITUATED a few miles to the west of the Sierra de Santa Catarina, in the valley of the Rio Santa Cruz, lies the Mexican town of Tucson. This place of about one thousand inhabitants contests with Prescott, in Northern Arizona, the honour of being the chief town of the Territory. Sometimes Prescott is declared to be the capital, and the few officials who carry on the law business of the Territory, whatever that may be, assemble there; the next year, or the year after, it is changed to Tucson, and the *courts* are held there.

Nov. 29.

The districts around Tucson have the reputation of being very rich in minerals, and it was for the purpose of investigating this question that Colton left the party at Camp Grant. I accompanied him, partly because I wanted to visit the old Papago mission of St. Xavier del Bac, and partly because

I was anxious to gain information as to the best way to reach the Port of Guaymas in the Californian Gulf.

We were two days riding the fifty-four miles from *Camp* Grant, as it is called, to Tucson. The trail we followed, which is far shorter than that along the San Pedro, led us out of the valley of that river by a pass almost due west of the post. We then turned southward, keeping the grand granitic range, the Sierra de Santa Catarina, parallel to and near us on the west, whilst a broken, inhospitable waste stretched out before us to the north, west, and south, as far as the eye could reach. This was the commencement of the Sonora Desert.

About twenty-four miles from Camp Grant, we stopped at a convalescent camp, to which the soldiers who have been reduced by fever and ague in the San Pedro valley are sent to recruit. We found nearly half the garrison here under canvas, their tents perched on a rising ground, at the foot of which was the only spring upon this "jornada" of fifty-four miles. Camp Grant seems to be very unhealthy. It is curious that in an uninhabited country, a good supply of water anywhere is almost sure to be accompanied by those pests to all early colonists—fever and ague. The men quickly recover in this dry upland country to the west of the mountains.

On leaving the convalescent camp next morning, we kept for about nine miles along the summit of a ridge which bounds a deep gorge, the Cañada del Oro, lying between the road and the Catarina Mountains. In this gorge gold has been found in considerable quantities, and all the western drainage of the range collecting in it forms quite a torrent after rain. When we came within seven miles of Tucson, we rapidly descended into the valley of the Rio Santa Cruz, crossed the dry arroyo coming from the Cañada del Oro, and

entered a vast thicket of mezquit trees, through which our path led for the rest of the way. These mezquits cover many square miles in the Santa Cruz valley; they are mostly of small size, averaging 20 feet, but where the river comes to the surface—it is here mostly subterranean—they grow into fine trees. They afford excellent cover for the Apaches, who are constantly "lifting" the cattle belonging to the inhabitants of Tucson, and preventing agriculture from being carried on anywhere except in the immediate vicinity of the town. These trees would be most valuable if the country were only quit of the red-skins, for they yearly produce hundreds of tons of the most nutritious beans.

I visited a farm in the San Pedro valley before leaving Camp Grant; it was only four miles from the fort, and yet all the crops that autumn had been cut down and carried off before they were ripe by the Aravaypa Apaches, and all that remained of the stock was a few pigs. Half-a-dozen soldiers were kept at this ranche all the year round to try and protect it, so that the fort might be supplied with fresh farm produce; yet during three years this farm has changed hands thrice; the first man was killed, the second was scared away by the frequency of the attacks made upon him, the third is now thoroughly disgusted, and talks of settling amongst the Pimas on the Gila, a friend of his having converted seventy dollars into two thousand by raising hogs in the mezquit bottom-lands along that stream.

At Tucson I made all possible inquiries about the best way to reach Guaymas. My first idea was to go by boat from Fort Yuma, on the Rio Colorado, and down that river into the Gulf; but I learned that no regular line, either of steamers or sailing vessels, plied between these places, and that if water communication failed me, it would be impossible to go

by land, as I should have to traverse the whole length of the Sonora Desert. From Tucson the way by land was open, and I should be able not only to see the Port of Guaymas, and judge of its merits as a terminal depôt for a railway on the Californian Gulf, but should have an opportunity of traversing Sonora, and of discovering what that out-of-the-way country was good for, and what route would be most likely to prove the best for a branch railway from the trans-continental main line.

There was a celebrated guide at Tucson, whose services I hoped to have obtained; when, however, he heard my proposal, he plainly told me that the risk was too great, and that he had had so much good luck in his lifetime, that he was getting too old to tempt Providence any more. So I hunted about for somebody else, and had the good fortune to meet with a man named Van Alstine who had taken refuge in Sonora, knew the country well, and was quite willing, provided of course he got well paid, to conduct me as far as Hermosillo. I hope I do not malign the character of so good a companion and so excellent a guide when I confess that at my first introduction to Van Alstine he was hopelessly drunk, and that he knew very little about the agreement he had made until I routed him up next morning, and told him I was ready to start. He was a tall, wiry old Western man, of at least sixty, but hale and hearty; though his hair was grey and scanty, his brain was active and his senses keen; he was a great talker, and made, as we shall presently see, very good use of his tongue. During the civil war he had been arrested as a Southern sympathiser, and confined for nine months at Fort Yuma. This is one of the many "hottest places on the earth;" so hot was it the summer he was there, that my guide told me of two soldiers who, noted

for their evil deeds, had died when the thermometer stood at 120° in the shade. The next day they sent back in all haste for their blankets.

Our "outfit" consisted of the following:—Van Alstine, riding a miserable grey horse which had seen better days and was now on his last legs, carried a pair of saddle-bags, a blanket, carbine, one six-shooter, a large tin mug, and a canteen. I carried my buffalo robe instead of a blanket, and had, I regret to say, one six-shooter extra; in other respects I was similarly equipped. My saddle-bags contained dry biscuits, a lump of raw bacon, coffee, and salt; also ammunition, tooth-brush, a flannel shirt, handkerchiefs, soap, and socks.

Dec. 2.

We had so far to travel, and so little time at our disposal, that I had exchanged my mare, Kitty, for a mule, before leaving Camp Grant. This mule belonged to Reed, the guide, and was one of the best specimens of these useful animals I have ever met with. He was as strong as a lion, and as plump as a partridge. He was very docile, well used to all kinds of hardships, and could keep up a fast walk, or "rack"—as the Americans call it—of five miles an hour from sunrise to sunset. On entering Tucson I became an object of suspicion directly because I rode this mule. Reed lives in the Mesilla valley, at the other side of New Mexico, but an old pal of his recognised the animal at once, and, eyeing me suspiciously, asked, "Is that ar your mule?" Smothering a slight feeling of resentment, I said it was; at which he replied, "Then I'm d——d if some chap han't been and stole it from my old chum, Joe Reed, though I haven't seen him these three years." He was disgusted when he heard that Joe Reed had really parted with his old beast of burden, and, giving me a slight wink by way

of apology, concluded by saying that, if I left the mule with him, "I was quite welcome to the difference."

The present boundary-line between the United States and Mexico has been well chosen, for it pretty nearly coincides with the southern rim of the Gila Basin. Highlands, covered with mountain ranges, are encountered all along the boundary from the Guadaloupe Mountains, which connect the Sierra Madre of Mexico with the Chiricahui Range of Arizona, to the Sonora Desert, and separate the head-waters of the streams flowing northward into the Gila from those running southward to the Gulf.

There are several routes by which Sonora may be entered from the north. There is a depression in the mountains to the west of Janos, through which a road, or mule trail, runs from the Casas Grandes valleys across the main divide into the basin of the Yaqui River. North-west of this route there is a trail, known as Cooke's Emigrant Road, which passes through the Guadaloupe Cañon, and leads to Fronteras and Santa Cruz. The same towns can be reached by following up the Rio San Pedro to its source, and the southern country can be penetrated by passing through the Cocospera Cañon, and joining the straight road from Tucson at Imures, on the San Ignacio River. From Tucson there are three routes by which Hermosillo, the capital of Sonora, may be reached. 1st. There is the straight road up the Rio Santa Cruz, across the boundary-line at Nogales, down the San Ignacio River to Magdalena, and thence due south to Hermosillo and Guaymas, a distance of 343 miles. 2nd. A road branches off to the westward at Canoa, thirty-four miles south of Tucson, and goes through Aravaca, across the mountains to the head of the Altar River, which it follows for some distance, then bears eastward again, and

meets the Magdalena Road at Santa Anna, a town a few miles south of that place. The third route goes still more to the westward. It leaves the second route at Aravaca, goes thence to Altar, and strikes the Magdalena Road a few miles north of Querobabi, a ranche eighty-five miles north of Hermosillo.*

The first of these routes is the shortest and best; but it is the most subject to attack from the wild Indians and robbers, whereas the other two, lying as they do in the Papago country, are much safer to travel by. These routes were very little known, whereas the first one had once been partly surveyed; this consideration finally decided us upon taking a course of our own, in order that we might become acquainted with the other two routes and their advantages for railroad purposes.

Sonora itself is a very mountainous country; from the Gulf coast it rises gradually to a central plateau, which is capped by mountains called generally the Sierra Madre. For at least one hundred miles to the west of the dividing ridge, range after range covers the whole country. Their altitude is not great, but they are very continuous and persistent; they are rugged and narrow, and lie almost invariably parallel to each other, except about the United States' boundary, where a transverse line of upheaval seems to have thrown the whole country there into confusion. The direction of the parallel ranges is mostly north-west by south-east, with a tendency in the centre of Sonora to run north and south. Along the narrow valleys between these ranges flow the little streams which rise either on the southern slopes of the northern watershed, or on the western sides of the Sierra Madre; and hard work have they to break through this succession of ranges. At last, however, when the zigzag

* These routes are given, with tables of distances, in the Appendix.

passages have been traversed from one parallel trough into another, and the more open strip of country lying between the mountains and the coast has at length been reached, the thirsty soil usually swallows up so many of the little streams that only two of the rivers of Sonora ever succeed in reaching the sea, namely, the Yaqui and the Mayo; all the others fail to cross the great Sonora Desert.

After this short glance at the country and the routes, we will start from Tucson, and follow the Santa Cruz River for nine miles to St. Xavier del Bac. This place is the most interesting relic of priestly government to be found in the entire region which was once Northern Mexico. Here stands a large church, cruciform in shape, with a dome over the intersection of nave and transept. The western front is lavishly ornamented with plaster saints, filigree work, and pillars, and is surmounted by two towers, one only of which is finished. All round, skirting the roof, is a parapet of small pillars, and above this are other ornaments, which help to screen the roof. On entering the church, the roof causes the greatest astonishment. It is formed of seven dome-shaped compartments—three for the nave, one for the chancel, two for each transept, and one over the central space. Each of these is ribbed or fluted from a central point, and the entire roof is made of small red bricks. The whole church is built of red brick: even the little pillars which adorn the tops of the walls are all made of bricks, which were moulded to the shapes required before they were baked. The altar is a very fair one, and above it is an elaborate combination of black gilt pillars and saints placed in niches. The centre figure is that of a priest, simply dressed in black, with a three-cornered hat. This, no doubt, is St. Xavier del Bac, a saint about whose great piety I am, I regret to say, grossly

ignorant. Most of the ornamentation appeared to be only of stucco, yet the gilding was very rich, and has well resisted the wear and tear of time. Whilst I was examining the interior, several Papagos came in to pray; they performed their devotions mostly aloud, and one woman, after praying for some time, began to sing. She made a most horrid noise, something between an Indian war-song and a Gregorian chant, which "moved me too much," so I went away.

This church would be considered a fine one in Switzerland or Germany, yet not a single priest lives here now, and only an occasional service is performed by one of the resident clergy from Tucson. Grouped around it are the conical thatched huts of the Papagos, who seem to have taken shelter under the shadow of the great giant rising from their midst. Not a creature lives here except these Indians. There is not, besides the church, any building larger than a hut. I wondered, as I looked at this strange sight, whether it might not have fairly represented a Saxon village in the twelfth century—a number of huts clustered around a fine massive Norman church—and whether our ancestors then were much more civilised than these Papagos of the present day. As the Saxons proved, in the race of centuries, stronger than their conquerors, will these Papagos also in time regain their ascendency over us? They are not Red Indians; they do not belong to that debauched and degraded stock which melts away before the breath of the white man. They are of the South—Aztecs, or native Mexicans, as you like—but semi-civilised people, not savages. Already they have risen superior to the Spanish element, and have proved themselves better men than the mixed blood—the Mexican. It is, therefore, worth while to wait and watch the meeting of the waters, the mingling of streams never before brought

together—the Anglo-Saxon and the semi-civilised native American.

How well these Indians must have worked under the Spanish missionaries to have built such a church! I have seen no other building made of furnace-baked bricks in the country; all this they must have learned. Then there was the building of the roof of brick arches, the moulding of the ornaments for the towers and decorations, and a thousand other arts necessary for the successful completion of such an undertaking. I really know not which to admire most, the adaptability of the Papagos or the zeal of the priests.

Leaving St. Xavier del Bac, we kept to the road along the valley, occasionally passing an uninhabited ranche, until, after travelling eighteen miles from the church, we found that an American had lately taken possession of a ruined house called "Roade's Ranche;" and here we got a shakedown for the night.

One word about the Rio Santa Cruz, the eccentric course of which can be traced at a glance on the map. For the first 150 miles from its source it is a perennial stream; but four miles south of Roade's Ranche, at a spot called Canoa, it usually sinks below the surface; it then flows underground almost to St. Xavier (twenty miles), and again reappears at a spot called Punta de Aqua. The Papagos are thus supplied with water, and are enabled to raise what crops they require around their huts by means of irrigation. Beyond St. Xavier it usually again sinks, rising for a third time as a fine body of water near Tucson, enriching a broad piece of valley for about ten miles around that town, turning the wheel of a fair-sized flour mill, and then sinking for ever in the desert to the north-west. During some seasons it flows further than others, so that the length of stream above ground is

subject to considerable variation; but it never succeeds in reaching the Rio Gila on the surface, although I believe it flows over the bed-rock and under the drift which covers it for the remaining one hundred miles from Tucson to the Maricopa Wells, where a large spring—the waters of the Rio Santa Cruz, as is believed—comes to the surface and flows into the Gila. Wherever water can be obtained, the valley is exceedingly fertile, and might, under cultivation, be made very productive. South of Tucson, fine pasturage clothes the high lands on either side.

Four miles from Roade's Ranche, on the following morning, we left the valley and the main road, and, on reaching Canoa, bore to the westward along a tributary stream until we reached, about mid-day, the next inhabited ranche, called "Sopori," distant eleven miles from our last halting-place.

Dec. 3.

This ranche was built on a rock, and still further strengthened against attack by a wall of stones, which completely surrounded it. On climbing up the rock, and getting over the other defences, we found in the house five girls and one little boy. The girls were all grown up, ranging in age from seventeen to about twenty-five. They met us as if we were rare curiosities, and invited us to partake of their meal. Poor people! it was bad enough, for it consisted of sun-dried Mexican mutton fried in grease, and very badly-made tortillas.* They told us that they were a family of Southerners; "and as we uns could not live with you Yanks, father thought it best to clear out in time." The father and eldest brother were out in the Santa Cruz Mountains, cutting pine for the miners there; but as they had seen nothing of them for three

* Flat cakes made of dough without yeast.

weeks, they began to "hope that the Indians had not got them."

The girls chatted away with that perfect ease which strikes a stranger so much, even in the humblest of the people, provided they are Americans bred and born. This emigrant family got on very well at first, their flocks and herds multiplied, and the well-watered strip of land around their house produced abundantly. But the Apaches found them out, and drove off the stock again and again; they killed two of their brothers, and frightened their mother to death when their last little boy was born. "But," said the youngest girl, "they haven't been here now for two years, so we are expecting them every month." This girl then told me of her experience in Indian warfare.

About the time of the last visit from the Apaches, she and a little Mexican girl were on their way to meet their fathers at the mines up in the mountains, accompanied by some peons, when they suddenly fell into an ambuscade. The Mexican peons fled for their lives, leaving the two girls in the hands of the Apaches, who placed them on ponies and carried them off across the mountains. At first they were kindly treated; but in the meantime the peons had given the alarm, and the father, with all the miners working with him, started off in pursuit. When the Apaches found themselves hard pressed, they stripped the girl (who was then fifteen years old) of everything, even her shoes, knocked her senseless with a blow on the head from a tomahawk, speared her in several places, and, after shooting some arrows into her, left her for dead. She rolled off the footpath down the bank, and was thus hidden from sight when her father and his party passed by, but a few feet from her. As far as she could make out, it was forty-eight hours before she recovered

consciousness. Then she found herself covered with blood and pierced with arrows, three through her arms and one through her leg. She broke off the heads and drew them out, and then tried to crawl up the bank and regain the footpath. She had no water, no food, no one to help her; and yet thirty miles separated her from the mine, which was the nearest point where she could quench her burning thirst.

It is almost impossible to conceive any position so terrible. The idea of a young girl, perfectly naked, wounded in this manner, and dying of thirst and exhaustion, finding her way back over thirty miles of stony path, across mountains, to a place of safety, is almost too incredible for a sensation novel; and yet this girl did manage to creep, by slow stages, over the entire distance, and, in six days of inexpressible suffering, appeared in a state of high delirium before her father. She told me this in the presence of her sisters; and they were honest, homely people, who would not, I am confident, say what was untrue. I saw the scars of three arrow-wounds on her arms, and can well believe her when she says that on her body there are several other scars to bear witness while she lives of that terrible journey. Some time afterwards, the Mexican child was retaken and given back to her parents.

Van Alstine and I bade our fair hostesses adieu, thanked them for their hospitality and their chat, and wished that they might never see any more of their enemies, the red-skins. As we rode along, we talked for many a mile about these five daughters, all alone in the Sopori Ranche. They had plenty of fire-arms, and knew well how to use them behind their stone barricades. But what a life of anxiety and watching is theirs! and what joy it must be to them when their father and brother come home safe from the mountains!

Eleven miles more brought us to the Colorado or Heintzel-

man Mine. One or two hundred Mexicans still live here in huts which were built by the proprietors of the mine for their peons when they established their works; systematic mining has, however, for some years been discontinued, although the yield exceeded 200,000 dollars in silver. The inhabitants now live by the pickings, and by extracting silver from the ore in the roughest possible manner. We inspected the square formed by the adobe houses of the Gambusinos,* and my guide tried to get a few eggs, and some corn for our animals; but failing in both, and not liking the looks of the people, we continued on our way for four miles further. It was then dark, and finding good grazing ground, we picketed out our horse and mule, and went to sleep. We remained so long at Sopori Ranche that this day's travel was only twenty-six miles.

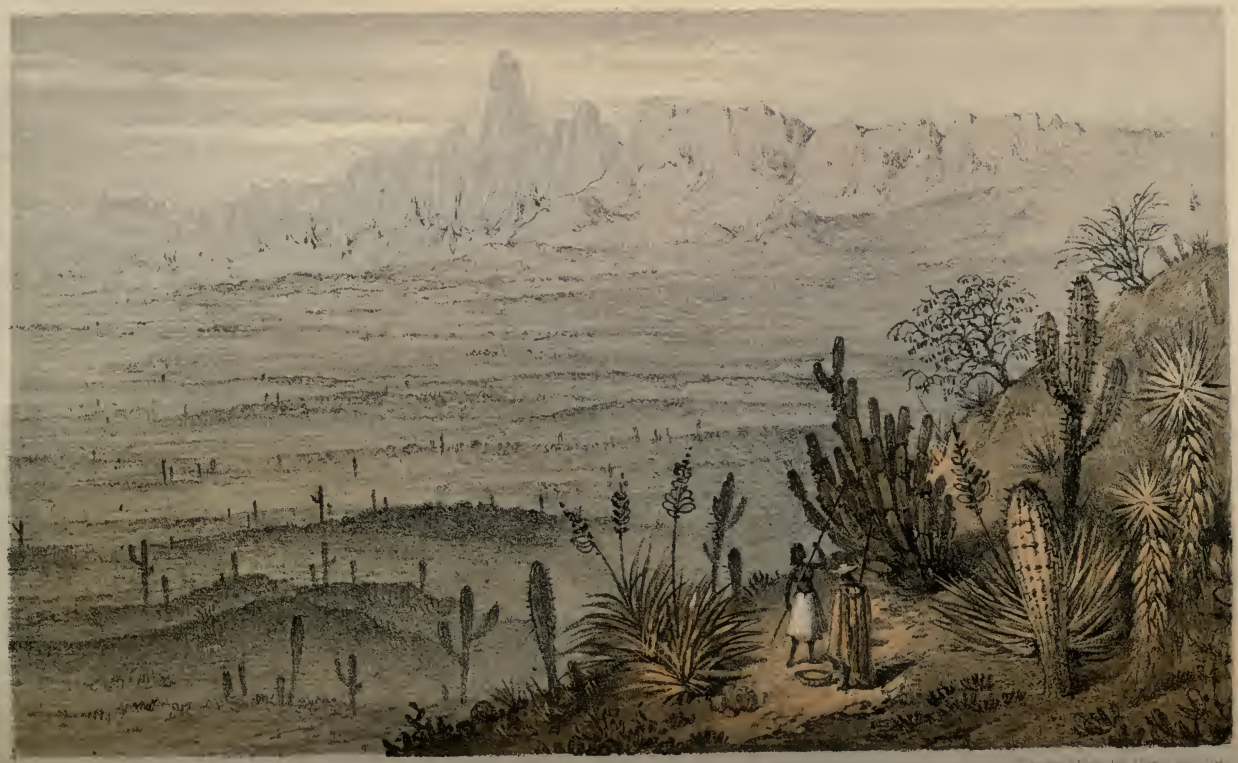
A four miles' ride before breakfast brought us across a little dividing ridge into another valley watered by a stream called the Aravaca. Here are the deserted furnaces of the Colorado Mine; and a row of telegraph poles along the hills uniting the places shows very clearly that extravagance must have had something to do with the downfall of this mining enterprise. The Aravaca valley runs east and west, and a very rugged range of mountains bars the direct course southward on the opposite side. So we turned to the eastward, intending to cross these mountains by the trail which strikes the head of the Altar River. On this trail, nine miles from Aravaca, is to be found Enviguetta—another relic of mining enterprise—where a fine steam-engine and a mill of, I believe, twenty stamps, with well-built houses for superintendent, employés, &c., now stand idle. One man takes care of this place; and he did us a very good turn.

Dec. 4.

* Poor Mexican miners, who mine each on his own account, and club together for mutual protection.

Van Alstine's old charger had by this time broken down completely. He could, in fact, go no further; but we spied a very fat and docile-looking mule disporting himself near the mill. Now, amongst the gentlemen of Tucson who were most ready to assist me on my trip, and who gave me introductions which I found most useful, none was more kind than Dr. Lord. Not only had Dr. Lord all the practice of the place, but he seemed to have monopolised most of the business also; and so active a mind found no difficulty in combining the professions of general merchant and physician with great ease and profit. He was also superintendent of this defunct mining company, and owned the mule of which we stood so much in need. I therefore persuaded his servant to lend us the mule for the trip, to be returned by Van Alstine some time within the space of three months. It has not been, and probably never will be, my good fortune to thank the doctor personally for the use of his valuable quadruped—we should probably never have reached Guaymas without it—so I hope that, as books nowadays travel even further than those who write them, this expression of the deep obligation I am under to him will some day reach him, even at Tucson.

The account given us of the country ahead by the man in charge of the mill led us to change our course. The trail leading to the head of the Altar River crossed a divide quite impassable for any railroad, but we heard from him that through the wide valley which lay to the east of the Baboquivari Peak, an almost level pass led into Sonora, and that a trail to Altar went that way. This route was generally, I may say, impracticable for travellers, from scarcity of water; but, as luck would have it, we had heavy showers three days in succession, so we concluded to take this latter route, at all



events far enough to examine the pass at the southern end of the valley before mentioned, which I shall in future call by a local Indian name—the Zazabe valley.

A ride of twelve miles next morning (almost due west from Enviguetta) brought us in sight of the Baboquivari Peak. From some foot-hills on the east we looked westward across a valley (Zazabe valley), about twenty-five miles broad, and thrice that distance in length. Straight in front of us, on the opposite side, rose a range of bare rocky mountains of exquisite outline, and surmounted by that grand peak which formed so good a landmark for triangulation during the Mexican boundary survey—the Baboquivari Peak. The peak itself looks like one huge needle rock, thrust up vertically for a thousand feet above the highest mountain summit of the range. The valley seemed to be a wide, grass-covered trough between two parallel mountain ranges, and in its centre there was a depression, the only indication of drainage visible on the surface. Bearing to the southward, we followed down the valley on the eastern slope until evening, having a range of mountains always near us on our left, when we made a dry camp and halted for the night. This day's journey was about thirty miles.

A five miles' ride before breakfast next morning brought us to the end of the valley and to the commencement of the pass. Here the former had lessened in width from twenty-five miles to a passage of scarcely half a mile, which rose very gradually between the foot-hills of the ranges on each side, and led across the divide out of the Gila Basin. A short distance up a side arroyo in that narrow part we found the Zazabe spring, where we watered our mules and breakfasted. After a ride of eleven miles further we struck a Papago trail leading from Fresnal and

Dec. 5.

Tecoloti, Indian villages west of the Baboquivari Peak, to the valley of the Altar River, and although the country looked anything but inviting, the direction suited us, and we determined to follow it.

About thirty miles of terribly rough, inhospitable country lay between the open plains we were just leaving and the Altar River; and so difficult was it to find the way through the endless hills and dales, crags and dry water-courses, here encountered, that two American prospectors a year and a half ago lost their way and nearly perished in trying to cross it in the opposite direction. After travelling some seven miles we came to a spring known as Ojo de Santa Lucia, where we watered our mules, and on starting afresh, found ourselves suddenly in the midst of an Indian rancheria. Huts appeared all around us, and in considerable alarm I cocked my carbine, and certainly expected that we were in for a fight. I had quite forgotten the Papagos, in whose lands we were travelling. These were their huts, so there was nothing to fear. Between twenty and thirty temporary huts represented a large party of Indians, who were making one of their periodical journeys into Sonora from their own villages in Arizona, to trade with the Mexicans; and we perceived, from the pony and cattle tracks, that they had much stock with them.

Twenty miles further, we entered a district at the foot of a lofty conical hill, called Sombrerito, from its resemblance to a hat, where a great number of gold quartz veins crop out on all sides, and where native miners are wont to wash for gold at certain seasons when the gullies contain water. Here the little indistinct paths were so numerous that we lost our way, and got entangled in the cañons and arroyos which cut the country into a thousand segments.

Of course I had a compass, and we first tried to steer by it; our mules responded well to the spurs, and we kept them jogging along and climbing up and down the most terrible places. However, the country got worse, and by sunset this mode of solving the difficulty was proved a failure. Van Alstine then determined to keep to one arroyo, and follow it, if possible, down to the Altar River.

On we went, hour after hour, winding about at the bottom of the gully, now pushing through thick brushwood, then climbing over masses of rock, sometimes in the darkness knocking our heads against overhanging branches; for, as the moon was obscured by clouds, the mules alone were able to see. About ten o'clock we almost tumbled up to the animals' necks, without knowing it, into a wide stream, which proved to be the Altar River. We found a road on the other side, and, four miles further, a ranche, where we pulled up. I passed a capital night coiled up in my buffalo robe at the bottom of a cart in the yard, but a worse fifty miles I never passed over than those which formed our fourth day's march.

One day's rest was absolutely necessary to the mules, so next morning we did not go further than six miles, where was another ranche at which we could obtain accommodation, and something to eat besides dried mutton and tortillas. Here we passed the next twenty-four hours, and here occurred a tragedy which is, I think, worth relating.

Dec. 6.

This ranche was a good representative of its class. It was built of adobe on a rising ground overlooking the narrow little valley of the Altar River, and was to all intents and purposes a fortification. Four walls about 12 feet high, without windows, enclosed it in the form of a square; and at three of the angles three watch-towers—also built of adobe—

with loopholes, formed the defences. A large gateway opened through the house into the yard, leading to the stables, sheds, and pigsties, all of which were enclosed in the wall. On entering the gateway, a door led to the right and left into two large rooms; one was the storehouse and barn, the other the general sleeping apartment, common to all the inmates. Of course, no beds, or other luxuries which ordinarily denote a bed-room, were visible, but an old-fashioned oaken press and a well-swept floor sufficiently suggested the fact to any one accustomed to rustic Mexican life. Cooking and household duties generally were carried on in the outhouses, which were built against the high wall all around the yard.

After walking the mules through the house to their sheds, and giving them plenty of corn (maize) and corn-stalks, we watched with pleasure the decapitation of a fowl and other preparations made by our good hostess for the coming meal. How good was that fowl, and the poached eggs which followed it! When bedtime arrived our little party had increased to a tolerably good roomful, considering that we had all to take possession of different parts of the floor. There were of the household the mother, the aunt, the father, three little boys, and the baby, two farm-servants, and the maid-of-all-work. We all packed into the room, Mexican fashion; and, laying down my buffalo robe as close to the doorway as possible, with my head on my saddle, and my fire-arms by my side, I was soon oblivious.

When the lords of creation had made themselves comfortable, in crept the feathered fowl. A fine old cock and his wives perched on the shelf just over my head, and a lot of little chickens secreted themselves behind the press before mentioned. These were soon asleep. At midnight, however, the enemy came. I was suddenly aroused from my sweetest

slumbers by feeling my face most unmercifully scratched; the air was filled with the flutter of birds and the screaming of domestic fowl. I seized both pistols and stared hopelessly into the darkness; up started the maid-of-all-work, and one or two more, who tumbled over others in their attempts to escape, and thus completed the general confusion. At last a match was struck, and lo! nothing could be seen but a brood of terrified chickens. There was a cause for their alarm, and this cause we found behind the press.

When the human beings and the fowls had fallen to sleep, a pretty-looking little quadruped thought that this bed-room would be a very nice place for him also. He looks like a cross between a fox and a ferret, and carries a fine bushy tail; his body is striped with black and white, and he rejoices in the name of Skunk. Half-a-dozen chickens had already fallen a prey to his teeth and claws, and he was enjoying the flavour of their heads so much that no amount of probing up with divers long poles would make him stir from his hiding-place behind the press, so we sent a bullet through his head. He had his revenge, but he kept it to the last; for the stench which instantly followed that shot baffles description. After much good training I thought I could have slept through anything, or in the company of any one, but I had never before tried a skunk. I went away, and, as it was raining, took refuge with my docile mule. The most wonderful part of this little incident still remains to be told: the Mexicans, after grumbling a little about being disturbed, went back to their blankets, and slept it out until morning without more ado. Thus ended the adventure of the chickens, the skunk, and the midnight massacre.

With replenished saddle-bags and rested animals we started

afresh after a good breakfast, directing our course for a couple of miles further down the Altar valley, and then branching off to the southward on a trail leading to Santa Anna, across another rough belt of country lying between the Altar and San Ignacio streams.

Dec. 7.

We passed on the way two more collections of Papago huts, made but a few days back to shelter the same party from the heavy showers which had lately fallen. Not once had we met any one on the road since entering Sonora, and we were congratulating ourselves upon nearing an inhabited region, and having safely escaped all dangers from Indians, when a Mexican gentleman and his servant came in view. Seeing that we were travellers, he stopped and had an animated conversation with Van Alstine, the purport of which was, that some miles further on the road we intended to take he had been attacked by robbers, and but for the bold front shown by himself and his servant, they would most certainly have been robbed, if not murdered. Both were well armed, and they kept the brigands at bay by holding their loaded rifles steadily to their shoulders as they passed rapidly on.

This gentleman also stated that, a few days previously, an obnoxious justice of the peace had been robbed and murdered on the road, that the people were afraid to pass from one village to another, and that this lawless state of affairs extended down to the outskirts of Hermosillo. This news was not pleasant for us.

After riding twenty miles we came to some stagnant water, where we gave our mules a drink and filled up our canteens. A little further we entered a timbered country, covered chiefly with mezquit, and here we rested until night arrived, when we saddled up and continued our journey. The moon rose about ten o'clock, and gave rather too much light for peaceful

travellers in so dangerous a country. In a few hours we came within five miles of the San Ignacio River, upon which stream there are numerous settlements. Here we halted and slept out the remainder of the night, having completed about forty miles since starting in the morning.

Just as we were making a fresh start a suspicious-looking ruffian rode up to us, and wanted to know where we were going. We told him we were going all over the country, and showed him how beautifully six cartridges were packed away in the butt of our carbines, after which he took himself off.

Dec. 8.

Van Alstine had a friend at Santa Anna, a young Mexican dandy, who thought no small beer of himself. He had been to Europe and the States, and had made a good deal of money as a miller in his native village since his return. He spoke English fluently, and gave us some really good coffee for breakfast, after which we went on our way. At the little town of Santa Anna we struck the high road from Magdalena, the largest settlement on the San Ignacio River, and followed it for the rest of the way to Hermosillo. At Barajita, a small mining village twelve miles from Santa Anna, I obtained a fine specimen of gold quartz. About twenty-six miles further we came to some tanks close to the point where a trail from Alameda joins the main road, and as we had made nearly forty miles since morning, we concluded to halt; so, after watering our mules, filling our canteens and tin cans, and going a couple of miles away from the water-tanks for safety, we again took refuge in the woods, lighted a little fire, and cooked our evening meal.

What would the traveller do without coffee? Of all things it is the most necessary; it matters little what you have to eat, provided it fills the vacant place within, for all

the comfort comes from the coffee. It matters not how bad the water is, for plenty of coffee puts it all right. Cold, wet, and weary, our tin mug of black steaming coffee proved the best of night-cap, and a quart a day (that is, a pint to each meal) we found to be only just sufficient for one person. When you must work hard and brave all weathers, even the pipe must yield at last to coffee.

Two ranches only fill up the long distance of eighty miles between the San Ignacio and San Miguel rivers, and as we wished to avoid notice as much as possible, and to prevent any of the Mexican idlers who prowl about these places from laying any plans to waylay and rob us, we purposely travelled in a very eccentric manner, sometimes by day, sometimes by night, and never stopped long at any of these places. Thus we reached Querobabi early in the morning, made a hasty meal, gave our mules some corn—the real object of our visit—and started on again.

Dec. 9.

Querobabi is a large ruined stock-farm, where once some great Spanish stock raiser lived in barbaric state, owned vast flocks and herds which roamed all over this fine pasture country, and kept a large number of rancheros, peons, and retainers at his establishment. Such places are found all over the country, either quite deserted and in ruins, or partly inhabited, though stripped of all their former greatness. At this place I found five men of the Papago tribe standing at the entrance; they wore clean white cotton mantles thrown over their shoulders in the Spanish fashion—leggings, moccasins, and broad straw sombreros. As I stood by them I felt a dwarf, and on measuring them I found that the average height of the five was 6 feet 3 inches. There are, probably, few races of greater stature than the Papagos. Their skin was almost black.

The present occupiers of Querobabi seemed to have nothing about them to cause suspicion. They took advantage of the presence of a doctor to hold a long consultation with me, and the gift of a small box of pills placed us on excellent terms. But the next ranche, Tabique, had a bad name. Its owners had joined the Imperialist party, and lost their all in defence of Maximilian; and it was rumoured that since their return from temporary exile, they were in the habit of *harbouring* brigands, even if they did not go so far as to join them in their marauding excursions. This place was thirty-six miles distant, and could not be avoided, because the only water to be found on the road for a much greater distance was that contained in the tank belonging to this ranche; it was enclosed by a wall and thick hedge, which passed around it from the ends of the building at the back.

As there was no help for it, we jogged up to the entrance gateway on our tired mules just after sunset; looking, I imagine, as poor a pair of travellers as often passed through this deserted country; and a curious lot of people we found inside. All around the central enclosure different families of peons were gathered together under the tumble-down sheds or outhouses which had been built against the lofty outer wall. They were cooking their meals around the different fires, the lights from which flickered up between the legs and arms of the naked children, and half disclosed the features of the women, whose swarthy complexions and piercing black eyes peeped out from beneath the large shawls and robosos which covered them. The old mansion had been burned down in the late war, and blackened ruins appeared here and there, adding greatly to the general desolation.

Lounging at the gate, or occupying the few benches which the place afforded, were the male portion of the community.

Here we had a score or more of the most complete specimens of the stage brigand. A black matted beard, and a huge sombrero drawn well over the eyes, effectually hid their faces; they wore mantles thrown across their shoulders, long boots reaching far above the knee, with huge silver spurs; the fringes of their leather breeches hung over their boots; and knives and revolvers were but half concealed beneath their mantles. Van Alstine was, as usual, quite master of the occasion; he had a hearty word for the men, and chatted so much with the women, that it seemed as if he had never in his life been in such agreeable company. We watered and fed our mules, and succeeded in disposing of supper, after talking enough had been gone through to drive me almost wild; for, alas! I was unable to join, and could not conceive how they could find so much to talk about. The men, having also supped and inspected us thoroughly, smoked a cigaritta and gradually dispersed. When the place was pretty quiet, and the gates were being secured for the night, we saddled up and took our leave. This was a master-stroke of policy, and very probably saved us from attack; and as it is safer to kill foreigners than to allow them, when plundered, to escape —for much more fuss is made about them than the luckless natives—we had good cause for mutual congratulations.

Twenty miles further, we rode through the thick forest which had been reported so dangerous by the traveller we had met the day before, and then halted, as usual, in the bush, to give ourselves and mules a little rest, having travelled fifty-seven miles since starting the morning before. We had camped just at the outskirts of the mezquit forest, and, as it proved next morning, on the edge of the dry, streamless plateau. A range of mountains bounded us, all through the day and night, on our left, and appeared to be a continuation of the

range which lies to the east of Magdalena and the upper portion of the San Ignacio River.

Next morning we had scarcely started when we perceived a gap in this range a little to the southward, and as the sun rose we looked down upon a silver thread emerging from it; and soon a lovely rich green valley, studded with palm trees, settlements, and orange groves, came into view at our feet. We had reached the valley of the San Miguel River, and a ride of three miles brought us by a rapid descent to the picturesque little village of Torreon.

Dec. 10.

From the moment we crossed the divide out of the Gila Basin, near the boundary-line, we had been descending at the rate of at least 1,000 feet in every fifty miles; and as at the same time we were travelling due south, the change in climate was very considerable. I was heavily clad at starting; but the days were now too hot to wear a coat with any degree of pleasure, and we usually took ours off, preferring to ride in our shirt sleeves. And here, at last, we had reached the region where the date palm, the banana, plantain, and other hardy palms are to be found. The first view of palm trees growing naturally in the open country is a very beautiful one; and this valley, dotted with groups of these trees, coming so unexpectedly in view, seemed like part of another world. The cactus plants upon the plateau are wonders of their family, and probably present more varieties and larger species in Northern Sonora than in any other part of the globe.* These

* It is probably no exaggeration to say that one-tenth of all the known species of cactus are to be found about the boundary-line of Mexico. Dr. George Engelmann, whom I met at St. Louis, describes one hundred species in his paper on the Cactaceæ of the Mexican Boundary Survey. Since the date of this paper, 1856, many more species have been added to the catalogue of this region by Engelmann, Parry, and others. The seventy-two exquisite plates

were accompanied by large thick-stemmed mezquit trees, each carrying a fortune in pianoforte legs, and many hard prickly shrubs, whose tiny leaves and beautiful flowers were just opening to enjoy the spring; but the contrast between the crabbed, drought-stunted foliage of the plateau, and the graceful verdure in the San Miguel valley, was great indeed.

At Torreon every little adobe building looks like a summer-house placed in a garden. Palms shade it from the sun; high hedges of prickly pear—*Nopala Castiliana*, as the Mexicans call it—keep out the pigs and the cattle; and groves of large orange trees, golden with fruit, lead down to the river at the back. We chose the prettiest of these baby-houses, and tapped at the cane door. Two girls, neatly dressed in prints and white aprons, came to let us in. They had only just reached womanhood, and were very good-looking; but their cast of features was quite new to me. Their faces were oval, almost round; eyes large, soft, and very round, of a dark blue colour. Their complexion was rich olive, but not as dark as that of the Mexicans generally. Their hair was jet black, neatly dressed; their voices were soft; and they laughed merrily when Van Alstine asked them if they would take compassion on two such queer-looking foreigners. My companion knew at once that they were pure-blooded Opita Indians.

This was my introduction to the most courteous race

with which the paper referred to is illustrated are lasting monuments to the liberality of the American Government for the advancement of science.

The following number of species were named as definitely determined:—

Genera.	Species.
Mammillaria	23
Echinocactus	17
Cereus	24
Opuntia	28
	92

The remainder were considered doubtful.

of Indians on the North American continent. The early Spaniards speak of them in glowing terms. In a previous chapter Father Marco's testimony is mentioned; but the strongest tribute paid to them by the Spaniards is that of naming the State, Sonora. The Opita country extends from the Rio San Miguel eastward to the Sierra Madre. It is a fine country, and the people are a brave and manly race. They were greatly delighted with the beauty of the first Spanish lady who visited them; and as they could not give the Spanish twang to the ñ, and wished to address her in her native tongue, they called her "Sonora," and the Spaniards, out of compliment to them, gave that name to the State.

It seems to be the fashion amongst many travellers to extol the beauty of savage races; to paint glowing pictures of young Indian squaws, and almost to rave about Hottentot Venuses. I have seen some fine races of Indians, and men, as well as women, of perfect symmetry; but beauty I consider quite out of the question. The faces of all I met, who had passed their childhood, were completely devoid of any single expression which could call forth other feelings than those of curiosity or disgust, until I encountered the Opitas of Sonora.

The Mexicans generally are gifted with a very small share of good looks; chiefly, no doubt, because the Indian element has overpowered and often destroyed the fine features of the Spaniard. But the settlements along the two rivers which unite at Hermosillo, and form the Rio Sonora, have been famed during two centuries for the beauty of their women, and this reputation I fully endorse; indeed, the mixture of Spanish with Opita blood could not fail to produce such a result. As I passed along the streets of Hermosillo, and watched the women assembling for matins, or returning from some religious festival, their chief occupation, I recognised in

most of the pretty women—and these were not a few—the round, oval face and the large, soft, dark blue eyes of the Opita as distinctly as if I had known their great grandmothers. I must not forget, however, that we have stopped at the threshold of the little ranche at Torreon, and that I have much more to tell about the Opitas hereafter.

Our mules just managed to squeeze through the door into the house, and out to the back-yard, where they got a famous breakfast. The girls set to work, and gave us large bowls of pap-corn and milk, followed by eggs, fowls nicely cooked, coffee, and hot tortillas. Van Alstine was more talkative than ever. Unfortunately for myself, I could not tell them that I was the bachelor of the party; and, in fact, I found the position very trying, particularly whilst the tortillas were being made.

Now if there is one feminine occupation more graceful than all others; if there is one which shows in the highest perfection the delicate hand and the rounded arm, and suggests, by an easy movement of the chest and body, the curves and outline of figure we love to admire in their perfection, it is the manufacture of tortillas. A lump of dough, which has been carefully prepared from Indian corn, finely ground, is placed between the palms of the hands, and whilst the arms are raised a little, a whirling motion is given to the dough, until, by gentle pressure most delicately applied, it is flattened out into a disc about a foot in diameter, and as thin as a wafer. It is then skilfully jerked upon a flat dish, and lightly baked. I would far rather see them made than eat them; for they are very much like my idea of underdone chamois leather.

When we had finished eating, the old father took us into the orange grove, and filled our pockets with magnificent

oranges and limes. He showed us his stock of corn, his fields, and his poultry; and after a rest of about three hours, he insisted upon saddling our mules himself, and would only receive payment for the fruit. Thus refreshed at the outskirts of the settlements—for the country we had passed through was practically uninhabited—we crossed the river, and proceeded on our way to Hermosillo through avenues of large cotton-wood trees, past several settlements and some fine haciendas. The hacienda of Labor looks like a large country-house, reminding you, however, of Spain and the Alhambra by its horse-shoe arches and Moorish arcades. Leading up to it is a broad avenue, lined on each side with the square-shaped huts of the peons, made of canes, lightly thatched and shaded by the trees above. Here humming-birds were fluttering over the flowers near the house.

All around, and for some distance above the river, every acre appeared to be under cultivation. The banks were clothed on both sides, to the water's edge, with plantations of sugar-cane; beyond these, some thousands of acres of cotton had just ceased to bear the feathery pods; and further back, again, were fields of maize, wheat, and beans.

On the outskirts of this and several other settlements passed on the way we met some of our old friends, the Papago Indians. They had built very neat conical huts, thatched with care, and seemed to be doing a prosperous trade with the Mexicans.

Now, I remember very well in England, before I ever thought of coming to this out-of-the-way part of the globe, that some near relations of mine used to meet other girls of their acquaintance, given like themselves to good works, for the purpose of holding Dorcas meetings and making clothes to cover the poor heathen. I long tried in vain to discover

what garments were considered by my fair acquaintances to be most appropriate, and what heathens were to be the fortunate recipients of their gifts. At last, in an unguarded moment, the secret came out—they were red flannel petticoats for the North American Indians. In my ignorance I laughed at the novelty of the idea; I even made fun of it, regardless of their wounded feelings. But of the existence of Papagos I was then entirely ignorant, so that great was my wonder and delight when I made the discovery that the most highly-prized garments worn by the squaws were red flannel petticoats. There they were, without a doubt; almost every woman wore one. Their breasts were bare, and no stockings covered their legs, but *the garment of garments*, so modest and unobtrusive, could not be overlooked.

All the water of the river being absorbed by the Hacienda de la Labor, eight miles of dusty road have to be traversed before any more cultivation is seen, and then another large farm is passed—the Hacienda del Alamita—owned by Signor Inigo, and containing several thousand acres of irrigated land. A wood, nine miles long, lies between this place and the capital —Hermosillo; and when we arrived at the entrance to it, we found three poor labourers and a woman, each armed with a bayonet only, waiting for an escort of some sort through the wood. All day long they had been wanting to return to their own village, but so unsafe was it to pass through the wood that they feared to proceed alone. Our three revolvers and two repeating rifles gave them confidence, and they trotted close behind us all the way. We passed a mule which had been killed the day before in a skirmish, and the vultures were anxiously waiting on all sides for the dainty meal to putrefy. At another place, where an arroyo crossed the road, one of the men pointed to some large rocks, and said, "There has been

much mourning caused here;" but good fortune favoured us to the end of our journey, and we were stopped by no one.

The long distances we had travelled day after day, and especially the extra night-work, had nearly finished off our mules. This last ride made mine stone-lame, and Van Alstine's could scarcely hobble along. In this condition, late in the afternoon of a dry, dusty, sultry day, bereft of coats, wearied and travel-stained, with our tin mugs and other traps dangling behind us, we entered Hermosillo. We passed some Mexican dandies taking their evening ride on showy horses with gaudy trappings, and followed by their armed servants; then, being painfully alive to our wretched appearance, and not wishing to meet any of our future friends, we entered a side alley and gained our hotel by a circuitous route, where we soon indulged, with infinite relish after our weary ride, in a good tub and a hearty supper.

CHAPTER VIII.

HERMOSILLO.

Peculiarity of its Situation.—A Marble Mound.—The Town.—Architecture of the Houses.—The Gardens.—Ruinous.—The City taken and retaken several times during the War.—Assault by the Liberals.—Rescued by the Opita Indians.—Mexican Politics.—Governor Pesquera.—"Volunteering."—Rumours of War.—All Fire-arms demanded.—Inequality of the Sexes.—The Indians of Sonora.—Population.—The four Northern States compared.—Annexation.—Any Change must be for the better.

HERMOSILLO is a most curious and interesting old town. In the first place, its situation is peculiar. For 2° of latitude our route had been on the eastern side of a vast plain, not far from the base of the mountains. On the western side of this plain lies another range, too distant to be seen from Santa Anna, but gradually encroaching upon the plain until it joins the eastern range a little below Hermosillo. The San Miguel River emerges from the eastern range just above Torreon, and, having joined the Rio Sonora, cuts through the western range at Hermosillo. In the very gap through which the river passes the city is built. In the centre of this gap, and rising high above the houses all around it, is a curious natural mound composed of variegated marbles, chiefly white and pink, which stands out boldly against the sky. It is called by the Mexicans "Bell Rock," on account of the metallic sound given out by the strata when struck.

One would suppose, from the size of the place, that it contained about 15,000 inhabitants; but as every third

house proves, on inspection, to be uninhabited, 9,000 is probably more nearly the population. A large Moorish town in Spain of about the seventeenth century was probably not unlike what Hermosillo is at the present day. Many of the houses are very large, and cover several acres. They are built of adobe, one story high, with very solid walls, and contain large, lofty rooms. Outside they are ornamented more or less with paint and stucco. No windows are usually to be seen; if a few do face the street they are guarded with strong iron bars, and differ in shape from our ordinary windows in being narrower at the top than below. They represent, in fact, that shaped cornice which the Moors introduced from Egypt into Spain, and the Spaniards into Mexico; and thus it has travelled more than half around the world. An archway in the centre of the block leads through huge oaken doors to the saguan, or hall, with large rooms on either side, and a court, or patio, in front. The court is surrounded with a deep verandah, forming "the corredor," supported all round by a massive Moorish arcade, and ornamented with birdcages, statuary, creeping plants, flowers, and palms, with a fountain in the centre of the patio. Doors open upon the corredor from the different rooms, none of which are set apart exclusively for sleeping; for during most of the year temporary cane cots are placed in the corredor at bedtime, and removed every morning. Facing the saguan, or entrance-hall, on the opposite side of the patio, is usually another archway, through which a vista, cool and refreshing, is obtained of the garden. Every house of any pretensions has a garden at the back. It is usually small, shut in by very high walls on all sides, and filled with tropical and semi-tropical plants, orange trees, banana palms, poison olive, fruit-bearing cacti, and flowering creepers; it is also ornamented

with little bowers and summer-houses, in which tame birds chirp and twitter.

Numerous irrigating canals run through the city, and send off branches to the different mansions; and although in years gone by the wealthy families must have lived in great luxury, it was the luxury of an age very picturesque, but long passed away in Europe. There are two plazas, several churches, a large mint—the only modern building in the town—a fine park ornamented with four large gates of Moorish design, and a burial-ground full of interesting monuments. But everything is going to rack and ruin. Civil war and family feuds have left their marks on all; even in the late war the city was taken and retaken several times, and the property of each party was alternately plundered by the opposite faction. When Hermosillo was first taken by the Imperialist party, some cannon had just been forged at the mint by means of native coal obtained at the Bronces Mine on the Upper Yaqui. These field-pieces, four in number, were exhibited at the Paris Exhibition. The city remained in the hands of the Imperialists until the spring previous to my visit, when two thousand so-called Liberals appeared before the place early in the morning of the 5th of May.

A hard fight took place between the little garrison and the assailants; no quarter was given, and all the defenders were at last overpowered and slain. Then the rabble crew commenced robbing and plundering all through the town. Not an inhabitant was to be seen in the streets; every shop was closed except those which had been broken open, and were being sacked by the rabble. By eleven o'clock in the forenoon the Liberals had laden themselves with spoil, feasted and drunk until many of them were placed hopelessly *hors de combat* from liquor, when, suddenly, the cry came from the

east that five hundred Opita Indians, under their brave chief Tonera, were already within sight of the town. This tribe, accustomed to take an active part in politics, had long adopted the Spanish or Mexican mode of life, and when Maximilian was made emperor, they joined his party, and fought to the last in defence of the Imperialists. Out rushed the Liberals from the cellars, the larders, the storehouses, and the mansions they had been rifling, weighed down with plunder, and half drunk with mescal spirit. They ran through the streets, and met their foe upon the rugged side of the mountains, in full view of the citizens, each party hoping to gain there a commanding position for attack or defence. The Indians came on fiercely, though steadily, divided into two columns, taking advantage of every rock, or tree, or undulation of the rugged ground, and pouring volley after volley of well-aimed arrows against the two thousand men, who, huddled together without organisation, could not withstand the attack. The tide was soon turned, and back again rushed the Liberals, for a third time, through the streets, throwing away their ill-gotten booty in their flight, and closely followed by the exultant Indians, who, with shouts and yellings, speared and drove them from every nook and alley where they had taken temporary shelter.

By sunset quiet again reigned over the town. The Opitas had been completely victorious. They did not kill the wounded, nor plunder the houses and shops; they brought confidence to the inhabitants, and soon the town was thronged with men and women in holiday attire who came out from their hiding-places into the streets, feeling safe and secure under the protection of the Indians.

Dr. Duroin, the resident American physician, assured me that not an act of violence was perpetrated to his know-

ledge, and not an article of value was stolen by them from any one. When the Imperialist cause was entirely lost, the Opitas returned to their own lands, and left the turn of events to take its course.

The present state of Sonora is almost as deplorable as can be conceived. Before the war, a number of powerful families contended amongst each other for the spoils of office. In a territory so remote, whatever faction gained the State governorship obtained almost absolute power to crush and ruin those who had opposed them.

The people—humble, indolent, and averse, above all things, to the hardships and dangers of war—were made by force to fight the battles of their masters. Ground down to the dust, these peons are still in the most abject state of almost feudal bondage; their rights are unrecognised, they are never mentioned except as slaves, they can vote only as their masters direct, and they dare hardly call their lives their own. Before the war Pesquera's party had for some years been all-powerful, and he had been governor during three successive terms of two years. During the Imperial ascendency he fled to the States, and there became a shrewder and more far-seeing statesman; so that on his return he had no difficulty in regaining his power and greatly strengthening his position. He banished his enemies as Imperialists, pardoned those whom he thought might serve his interests, and snapped his fingers at Juarez or any other man who should attempt to interfere with him in Sonora. One-third of the leading families are still in exile.

A feeble remonstrance was made, by the representatives chosen by universal suffrage, about his extravagance. Whereupon he met his ministers, and told them that he also thought the expenditure too great, and therefore should

commence retrenchment by dispensing for the future with their assistance, and thus saving the salaries of a number of useless functionaries. The port of Guaymas is one of the chief sources of revenue. The customs duties levied at the Mexican ports along the Pacific coast average 100 per cent. on all manufactured goods, and the moneys thus received belong exclusively to the Central Government. This, however, was never allowed by the Governor of Sonora, who always kept the money, and by lessening the duties from 100 to 60 per cent., induced many merchantmen bound for Mazatlan to enter Guaymas instead, so that it has become customary for a vessel to wait outside these ports until a good bargain has been struck relative to the amount of duty to be paid on the cargo.

A few months before my arrival, President Juarez thought he would stop the misappropriation of his lawful revenue, and sent one of his own men, Signor Almuda, as collector of customs at Guaymas. Pesquera said nothing, but when 30,000 or 40,000 dollars had been collected, he suddenly appeared with a small troop of soldiers and demanded it; on being refused, out went Almuda from office, and another man was placed in his stead. The money was taken, and Almuda, finding resistance hopeless, returned after three days to his former position as collector of customs, but this time as servant of Pesquera, not of President Juarez. This little transaction occurred but three weeks before I met the Governor at Hermosillo, when, fearing that his extremely independent action might be interfered with, he thought it necessary to increase the State army. This was done by spreading the report of a Yaqui war. These Indians, it was noised abroad, had rebelled; "the whole Yaqui country was in an uproar!" "all travel was stopped!" "the Mexicans were being brutally massacred!" "to arms! to arms!!"

These were the cries. I was on my way to the Yaqui country, to examine the coal-fields there, and these reports effectually stopped my progress southward by land.

This is the way volunteering was carried on at Hermosillo. In the evening the military band usually played either in the plaza or opposite some gentleman's house. One evening, whilst listening to it from a window, and watching the men and women going to and fro, I suddenly perceived that soldiers had taken possession of all the approaches leading to the band, and were encircling the crowd on all sides. They seized all the young men who were present, and carried them off to the Government coralle, where they passed the night, and where next morning they had either to pay a fine if they possessed any money, or to *volunteer* if they did not.

Then there came a proclamation that fire-arms were required, and that five dollars would be given for any weapon that would shoot; but if this proclamation failed, and the police had to come and fetch them, no money would be paid. Thus the unfortunate people were stripped of their arms, while robbers infested the country, and Apaches made raids upon them, almost to the gates of Hermosillo. How crest-fallen and dejected these volunteers looked as they marched through the streets, armed with old flint-locks, broadswords, or any other weapon they could obtain! Their pay was a mere farce, for after years of service they would, on dismissal, receive a draft for the sums due to them, to be cashed when the treasury had been replenished—which meant, never. As this kidnapping of young men for the army has been going on year after year, it has produced so great an inequality of sexes amongst the Mexican population that in Hermosillo there are seven females for every one male.

The Yaqui war was of course a myth. These industrious labourers at first took flight, not knowing what to make of it; but after a time, as nothing dreadful happened to them, they returned to their usual occupation.

A few words are due to the Indians of this State, for they have the reputation of being the quietest and most frugal in the whole of Mexico. The Yaquis are the hewers of wood and drawers of water; their homes are in the South, but they are to be found everywhere. In appearance they are not unlike the Papagos; but are not so well off—judging by those whom I met doing most of the labour at Hermosillo and elsewhere. They are of a rich copper colour, with long black hair and rather large noses; they go about almost naked, with only a small piece of linen about their loins; they are very active and trustworthy, and obey every order they receive from the Mexicans in the most subservient way. A Mexican señorita will not even take a parcel home from the shop where she has just bought it, but the first Yaqui that passes will run off with it without a word. I have seen this a hundred times. It is considered degrading to intermarry with the Yaquis.

The next tribe are the Opitas, of whom I have said enough; they will not work for hire, and stand on perfect equality with the Mexican population—excepting of course the chief families, which are the curse of this unfortunate country.

Lastly, there are the Papagos, who hold themselves quite apart, have their own Government, do not mix in politics, and only come in contact with the Mexicans for purposes of trade.

Besides these three semi-civilised tribes—the Aztecs of Sonora—there are a few wild Indians along the coast, but these are dying out like their brethren further north, and have already ceased to be troublesome.

None of the Apache hordes who have succeeded in depopulating Northern Sonora live in that State; their country lies quite to the northward, in United States' territory.

With regard to population, Colton places Sonora in his new map of Mexico at 147,133 souls, which is simply absurd. A Mexican estimate, formed by adding up the population of each town, and then allowing a fair approximation for the rest, places it at 85,664, in 1845. An American estimate, founded on the Mexican one, considers 100,000 to be very near the truth for 1861. But this authority includes 20,000 Papago Indians, whereas there are certainly not more than 3,000 south of the boundary-line. This reduces the estimate to 83,000. Since 1861, both Mexicans and Indians have been decreasing; the mines have been more and more deserted, and yet the population in the towns has not increased; on the contrary, they also have been losing in numbers. Hermosillo, in 1840, contained 11,655 Mexicans and 2,000 Yaqui Indians; in 1843, about 14,000, all told; and to-day the population is generally placed at 9,000 Mexicans, and 1,500 Yaquis. As I before remarked, every third house was unoccupied, and more or less in ruins. I might add, also, a long list of frontier settlements, none of which contain any inhabitants; and, in fact, I think that at the present time only 70,000 souls can be allowed to Sonora, including the Indian population.

Comparing this with the neighbouring States, we have:—

	Population.	Area. Square Miles.
Sonora	70,000	11,953
Chihuahua	164,000	15,534
Durango	156,519	6,291
Sinaloa	160,000	3,825

Sinaloa is the most populous, and its port, Mazatlan, is the most thriving town on the Pacific coast of Mexico. Chihuahua

has of late been fast declining in wealth, if not in population; but not to the same extent as Sonora, because she has had far less to contend against, both as regards hostile Indians and civil wars. It is easy, therefore, to understand how it is that the old Santa Fé trade has almost ceased to exist; and until a great change takes place in these productive provinces of Northern Mexico, there is little chance that commerce will again return to its ancient channels, and that there will be any permanent market for merchandise.

As things cannot be worse than they are, many think that they see in this utter state of prostration and national degradation the germs of a better future. Any change, they say, must be for the better, and they look to the prosperous States beyond the frontier to take Sonora and her sisters under their protection, and, so to speak, to give them a chance. I did not expect to hear this sentiment so freely and openly expressed by the Mexicans themselves; much as they were suffering, I supposed, until I came into their country, that the great jealousy they were considered to feel towards foreigners would make such an ultimatum decidedly unpopular, but I soon found reason to alter this opinion. They seemed to me to look upon annexation to the United States as their destiny, and one to be hoped for with as little delay as possible.

In speaking as I have done of the present Governor, I do not complain of him as a man. On the contrary, I consider him far above the average of Mexican governors, and I feel convinced that, as unity amongst the Mexican States is already merely fictitious, he will be willing to favour annexation, provided he thereby secures solid advantages for himself. That section of the governing class which now forms the party of power, would, no doubt, follow the same course; but

those opposed to him, although believing in the ultimate fate of the State, would disparage a union at the present time, simply because they could not themselves claim compensation. Thus there will probably always be, until annexation becomes an established fact, a strong party opposed to it from selfish motives alone, and that party will always consist of the future aspirants to office. National unity has already been destroyed, and the few patriots whom I have met are only too anxious to swear allegiance to a real republic, instead of a sham, and to renounce for ever that system of despotism and tyranny, that degradation of the many for the aggrandisement of the few, that corruption in office and disregard to law, which now disgrace one of the finest regions on the globe.

CHAPTER IX.

THE GULF OF CALIFORNIA.

From Hermosillo to Guaymas.—The Harbour.—The Town.—Trade.—Leave Sonora.—Carmen Island.—Salt Basin.—Oysters and our Oyster-man.—Pearls and a Pearl Merchant.—La Paz.—Mazatlan.—The Market.—Shopping in Mexico.—The Army.—The Harbour.—Lower California.—Arrive at San Francisco.

After remaining nearly a fortnight at Hermosillo, and making several excursions about the neighbourhood, I started on Thursday, the 19th of December, in a coach drawn by six horses—four abreast and two leaders—for Guaymas, eighty-four miles distant.

We travelled due south over a plain between two mountain ranges, which is usually a parched and arid desert, but which looked anything but a desert after the recent rains. About eighteen miles from my destination, I heard the gun fire for the steamer's departure, and had the pleasure of contemplating another month's involuntary sojourn amongst the people of Sonora. But my usual good luck in this trip stood to me to the last; for, to the surprise of all, the vessel was still in the harbour when we arrived, and did not sail until the next morning.

The true harbour of Guaymas covers an area of a little less than four square miles, in which space three small islands, the rocky peaks of sub-marine hills, rise perpendicularly from a depth of from three to four fathoms, and form a little inner harbour. From the bare volcanic mountains which enclose

the harbour, several irregular little promontories project into the water and occupy much valuable space. The total area, in fact, of water more than four fathoms in depth does not exceed one-half a square mile. The entrance is not quite a mile wide, and is guarded by a long rock island, called Pajaros, lying exactly in front of and outside it, which makes the harbour doubly secure. The main channel runs to the left of the rock. On entering, its course is at first north-east as it passes the rock, and then north-west as it enters the harbour. To the right, another passage leads to a larger, though shallower, basin, into which a small river discharges its *débris*. The depth of the channel is five fathoms until the rock islands within the harbour are reached, when it is reduced to four and three. Three fathoms can be obtained in the centre of the inner harbour between the rock islands and the town; but it is only close to the former that four fathoms can be found.

The accompanying diagram of the three harbours, San Francisco, San Diego, and Guaymas, all drawn to the same scale, shows at a glance the relative capacity of each. There is no question as to the value of San Diego harbour. It is admirably sheltered, will admit vessels drawing $22\frac{1}{2}$ feet of water, is at least four times as large as Guaymas, and is, next to San Francisco, the best harbour on the coast of California. It is, moreover, almost 300 miles nearer to New York than San Francisco, either by the Omaha line or that of the 35th parallel, and can be easily reached from the latter trunk line by a branch 211 miles long, which would traverse the most fertile portion of Southern California.

The results I arrived at from my reconnoissance through Sonora to Guaymas do not confirm the glowing accounts which have been circulated relative to the harbour of the

BAY OF SAN FRANCISCO

SAN DIEGO

GUAYMAS

Scale of English Miles

0 10 20

Three Fathom Line

latter. It is too small ever to become a commodious first-class port; its situation is bad, for it is too far up the Gulf of California (being 1,500 miles from San Francisco and 1,000 from San Diego), whilst a railroad to it from the North would leave the richest portion of Sonora untouched. As regards distance, supposing that the main Southern line were constructed along the 32nd parallel, and a branch thence by the shortest practicable route to Guaymas, it would then be 2,812 miles distant from New York, against 2,935 between New York and San Francisco by the 35th parallel route, the difference being but 123 miles in favour of Guaymas. Sonora, therefore, must be developed independently by local railways radiating from the coast inland to those sections of country which, on their own merits, are deserving of them.

The present trade of Guaymas is such that the three merchantmen which unloaded there during 1867 supplied more goods than the demand required. In Hermosillo, as well as Guaymas, all the store-houses of the merchants were glutted with goods, and the general complaint was that there were no buyers. Large quantities of Sonora wheat and flour used to be shipped from this port to San Francisco, San Pedro, Mazatlan, and other places along the coast. Now, none goes anywhere, except to the last-named port, and not very much there, since the monthly steamer has been prohibited from carrying it. Mazatlan has at least six times the trade of Guaymas, because the back country is well peopled, whereas Northern Sonora is almost uninhabited.

Comfortably packed away on board the *John L. Stevens*, one of the fine Pacific steamers, which, with their roomy berths upon deck and good ventilation, are palaces of comfort compared with our boasted "Cunarders," we steamed between

the rock islands in the harbour, and through the narrow channel into the clear, calm Gulf of California.

On the third day from our departure, we stopped at Carmen Island, close to the opposite shore (the coast of the Lower Californian peninsula), to take on board a cargo of salt and oysters. We were immediately surrounded by lighters, full of Yaqui Indians who labour on the Salt Lake, and I went ashore in one of them.

Carmen Island is worth a visit. It was purchased from President Juarez, during the Mexican war, by an American land company, which also bought nearly the whole peninsula at a great bargain, as it was when sold more than probable that Maximilian would have gained the day. Of this huge estate, the island we had just reached is the richest prize. Close to the shore, but partitioned off from the sea by a narrow strip of shingly beach over which the water never flows, is a lake covering an area of about six square miles, the bottom of which is composed of pure white crystals of salt—chloride of sodium—without any admixture or adulteration in the shape of sand, algæ, or other salts. Usually no water covers this area, and the salt has only to be raked up, packed in large sacks, and shipped to San Francisco. Here it is ground and sold, without any purification, as the finest table salt. Holes have been dug ten feet deep through pure crystals of salt. How much deeper they extend I could not ascertain, for the Indians only scrape as much from the surface as they require for exportation. Fine volcanic mountains form a semicircle around this lake; and when it rains, the drainage from them flows into the basin and covers the entire surface to the depth of a few inches. When I visited this spot it was covered with water; I tried to cross it, but the salt crystals were too sharp for my bare feet. As soon

as the water dries off again, all holes or irregularities of surface caused by the removal of the salt become refilled with crystals and obliterated.

It was the opinion of the American resident superintendent that this vast accumulation of salt was washed down by the rains from the mountains, in which he supposed that large quantities of disintegrated rock-salt were to be found. For, even supposing that this was originally an estuary of the Gulf, it is hard to account by that theory for the apparently inexhaustible supply, and for the fresh accumulations which still continue to form, although the sea has long since ceased to enter the basin. The purity of the salt, the absence of sand, and the great depth of the deposition cannot certainly be accounted for by the laws which regulate ordinary salt basins.

Seated beside me at dinner on the second day of my life on board ship, I found a very tall and gentlemanly Southerner. He had all the external refinement of a man who had mixed during a long life in the best European society, and had looked upon a princely fortune as a matter of course. The civil war had ruined him, as it had thousands like him; and here he was now, at the age of seventy, carrying oysters from Carmen Island to sell at San Francisco.

The San Francisco oysters very much resemble our natives. They are round, fat, plump, full-flavoured, and very good, but do not suit the taste of those who have long enjoyed the luxury of the large delicate molluscs which inhabit the Atlantic seaboard. There are fine beds of the long-shelled oyster in the Gulf of California; and as they will not grow in the Pacific Ocean, my Southern friend found that it paid him well to transport them 1,700 miles by steamer, and sell them on landing at six shillings a dozen, provided that not more than half the cargo had died on the passage.

Unfortunately for us, this special cargo got too much sunning before being deposited in the tanks. Many consequently died, as we quickly discovered by the most disgusting smell which took possession of the greater part of the ship. It took many days to pick out the corpses, and in the meantime I caught a fever; and notwithstanding the luxury of a bridal chamber for a cabin, a four-post spring-bed, and other comforts, arrived more dead than alive at San Francisco.

From Carmen Island we went to La Paz, a beautiful little town which nestles amongst palm trees at the extremity of an inlet, surrounded by those bold mountains of variegated volcanic rock so common along the coast of Lower California.* This is the only town on the peninsula.

Outside this bay many Yaqui Indians were diving for pearls, and, as may be imagined, we had a rich aquatic treat, watching the finest divers in the world as they brought up shells from eight fathoms of water. I need scarcely remark that these are not oyster-shells, but large flat bivalves of quite another family. The best pearls are contained in the body of the mollusc, unattached to the shell, and a common way of extracting them is to throw thousands of these soft lumps

* Until 1867, the physical geography of this peninsula was quite unknown, but in this year Mr. J. Ross Browne, accompanied by Mr. William M. Gabb of the Geological Survey of California, Dr. Von Lohr of the School of Mines, Freiburg, and a corps of assistants, made a scientific reconnoissance throughout its whole length. A full account of their researches will be found in Mr. Ross Browne's Official Report on the Mineral Resources of the United States for 1868, p. 630. A correct map of the peninsula was for the first time compiled from the results obtained by this party, and from it Mr. Ravenstein has drawn, on a reduced scale, that portion of the general map attached to this book. The slice of the peninsula which now belongs to an American land company has been represented; it comprises nearly the whole of Lower California, exclusive of the La Paz district.

Magdalena Bay was found to be a magnificent harbour, but fresh water was scarce, and the land arid, from deficient rain-fall.

The article referred to is a valuable contribution to our geographical knowledge, and well worth reading.

of flesh into a barrel, and allow them to decompose. The pearls, if there be any, are found at the bottom.

A pearl merchant, Mr. Peterson, here joined us, and after we had become well acquainted he showed me, in strict privacy, his autumn store. He was an old Norwegian sea-captain on half-pay, and took very good care that none but those he could thoroughly trust should even suspect the nature of his precious cargo. The pearls were of all sizes, colours, and degrees of delicacy. The dark, metallic variety —which to my taste is so beautiful—was, if anything, the most abundant; many of the white ones were very large, and some Mr. Peterson had succeeded in matching to perfection for earrings, by which means the value of each pair was greatly enhanced.

Leaving La Paz, we crossed the Gulf to Mazatlan, our last stopping-place in Mexico. Here we found two ships of war, one English, the other American, the former was just leaving, with 300,000 dollars of silver on board, the produce of the mines in Sinaloa. Although my illness was beginning to take firm hold upon me, I dragged myself ashore at four o'clock in the morning to attend the market, and was well repaid for my trouble by the busy scene of animation I found there. A motley crowd of Yaquis, Negroes, Mexicans, and Chinese had filled a large, square market-place to overflowing with every kind of indigenous merchandise and produce, conspicuous amongst which were the fishes and fruits.

A country must be worth something which can produce such a market as this; no town in any part of Europe could have been better supplied. I bought as large a string of bananas as I could carry for a real (one shilling), filled my pockets with oranges, and beat a hasty retreat, for the noise was something frightful. All screamed at once in their

different languages, and seemed to consider that the more noise they made the more certain they were to sell their commodities.

From the market I visited the principal street, and one glance at the large shops and mercantile establishments showed the nature of business here. Many of the counters were polished mahogany, the windows plate-glass, the goods mostly of English manufacture. Here, as in the other silver-producing States, merchants of capital were absorbing the precious metal, and sending it out of the country almost as rapidly as it was taken from the ground. I watched the handfuls of large silver dollars rattle on the counters, and saw how very little the people could buy for their money. A common shirt, for instance, costs at wholesale prices about three shillings; on entering Mazatlan the import duties double it, the merchant adds another three shillings as legitimate profit, and, including a penny or two for carriage, it is retailed at two and a half dollars in coin. All this comes out of the pockets of the people, and if mining is prosperous, the traders make enormous fortunes, and can well afford to build the splendid establishments which contrast so strongly with the poverty and degradation seen on all sides.

I next went to the plaza. The clocks were striking eight, and the troops were being inspected. In this little place of 11,000 inhabitants, 2,000 soldiers were being maintained; there were more men drilling in the plaza than could be found otherwise engaged throughout the town. The appearance of these soldiers was a perfect burlesque; they wore straw hats with green ribbon, but here all distinction of uniform ended; one had a broadsword, another a flint-lock musket, a third a French rifle, a fourth nothing but a club, and all were clothed in coarse cotton cloth, called manta. It

was the old story; one of Juarez's generals was expected, and the present Governor of Sinaloa thought it desirable to be prepared. The General did appear some days afterwards, and both "armies" met, and compared their respective strength; but as the local force proved to be in the majority, Juarez's

Mazatlan.

men prudently returned to head-quarters, and the war was thus brought to a close without bloodshed.

The accompanying woodcut gives an accurate glimpse of Mazatlan, and will more than answer the purpose of a description. The long building at the head of the inlet is the custom-house; beyond the hills at the back lies the Pacific

Ocean, and the water seen about the centre is a shallow part of the harbour, which has to be crossed in boats. The harbour of Mazatlan is not a very good one, for it is exposed to the south-west gales in one part, and to the north-west in another, so that it depends much upon the prevalent winds what position is the best for anchorage.

I left Mexico with considerable regret, for another month might have been well spent in travelling through different parts of Sonora, in visiting the coal-fields on the Upper Yaqui, and in examining the silver mines of Alamos.

The greatest source of wealth possessed by Sonora is undoubtedly her mines. I visited many of them, although I did not reach Alamos; and shall therefore conclude this account of my trip by fairly stating as much of the reliable information I then collected as I think is of sufficient general interest.

CHAPTER X.

THE NATURAL RESOURCES OF SONORA.

Agriculture:—Extent of Cultivatable Land.—Agriculture on the Altar, San Ignacio, San Miguel, Sonora, Yaqui, Mayo, and Fuerte Rivers. *Crops:*—Cereals, Beans, &c., Cotton, Tobacco, Sugar-cane, Mulberry, Indigo, Edible Cactus Plants, Agave Americana, &c.—*Stock-raising:*—Sonora a fine Grazing Country.—The Grasses.—The Shrubs.—The Rain-fall.—Stock-raising under Spanish Rule.—The Formation of Tanks.—*Mining:*—Wide-spread Distribution of the Mineral Wealth.—The Precious Metals.—*Silver-mining:*—Mines about the Boundary-line.—History of Mining under the Spaniards.—Change for the worse under the Republic.—Mining Districts; those subject to the Mint at Hermosillo.—Average Yield of the Principal Mines.—Southern District, subject to the Mint at Alamos.—*Gold-mining.*—*Coal.*—Relative Value of Sonora as a Mining Country.—Conclusion.

Agriculture.

The amount of land susceptible of cultivation in Sonora bears a very small proportion indeed to that of the whole country. In the first place, long ranges of mountains cover vast districts; in the second, the valleys through which the rivers flow until they near the sea-coast are very narrow, and contain little bottom-land; and thirdly, where the valleys do open out towards the coast, they are rendered barren and unproductive by the sinking of the rivers, which thus deprives them of the means by which they might be irrigated.

For instance: of the rivers which drain Northern Sonora, the first irrigating dam on the Altar River is situated thirty-three miles above Altar. From this point the stream is a permanent one down to Los Puertecitos in ordinary years,

thirty miles below Altar; but the average width of the valley for this distance (sixty-three miles) scarcely exceeds three-fourths of a mile. On the San Ignacio River, villages are found all along its banks wherever sufficient water exists for irrigation; but so scant is the supply that as far from the mouth as Santa Anna the river bed is usually, except after rains, a broad sandy arroyo, all the water having been diverted and absorbed by the acequias belonging to the settlements higher up the stream, viz., Santa Magdalena, San Lorenzo, and Santa Marta. These villages, including San Ignacio, form an agricultural district which produces many thousand fanegas* of cereals, and supplies six flour-mills upon the river. Even the San Miguel River does not supply nearly enough water to irrigate the narrow bottom-lands which lie on either side of it. The three flourishing haciendas of Torreon, Labor, and Iñigo, as they are worked at present, absorb nearly all the water between San Miguel and Hermosillo, a distance of thirty miles; and, south of the latter town, a dry useless valley widens out indefinitely towards the sea. There is much cultivation on the San Miguel north of the village of that name, and also on the Rio Sonora above Ures, where a considerable population can be well supported. These narrow valleys have supplied nearly all the food consumed by the mining as well as the agricultural population of Northern Sonora, and have, during many years of civil war, notwithstanding the ravages of the Apaches, exported a considerable surplus of wheat and beans beyond the boundary into United States' territory, where Sonora wheat is a staple commodity.

The Yaqui, Mayo, and Fuerte rivers alone—rising in the lofty ranges and plateaux of the Sierra Madre, and not, as do

* 1 fanega (410 lbs.) = about two bushels.

the others along the divide which limits the Gila basin—carry down to the low lands along the coast an abundant supply of water, enough in fact to irrigate all the low-lying districts situated between them, and representing not less than 2,500 square miles. It is this section of country, together with the special produce it is capable of yielding, which makes the agricultural resources of Sonora, in my opinion, of very great importance.

On all lands susceptible of irrigation two crops of cereals can, without difficulty, be raised in the year: a crop of wheat and one of maize, or wheat and beans, or even wheat and barley. The wheat is sown from November to January, and reaped in April—never later than May. The land is then given two months' rest. Maize is sown at the commencement of the rainy season—that is, about the 1st of July—and is harvested in November. The bean-crop may be sown even later than the maize, and the barley about the same time. The Australian wheat has been introduced with great success, for it ripens a month in advance of the ordinary kinds, and is not only out of danger before the season for smutting comes on (just before the summer rains), but a considerable time is thus ensured for the ground to lie fallow before sowing the second crop—a very necessary requirement.

Were Sonora, however, to become a populous country, and to be traversed by railroads, cereals only would be raised sufficient to supply the necessities of the miners and inland population; for cotton, sugar, and tobacco are far more remunerative, and thrive well all through the State.

Until the introduction of the Egyptian seed, cotton was cultivated with but little success in Sonora, for crops from the Mississippi seed, and other varieties, were very liable to failure. Now the Egyptian plant, properly cultivated, being

at least five weeks earlier than the American varieties, produces a certain crop, more or less productive, every year on land which can be irrigated at all seasons. On or about the 20th of March, when the frost is considered finally to have departed, the planter commences to sow his cotton, and what he sows in March and early April, he begins to pick in August. Cotton is sown even as late as July, but the season for it being consequently a short one, a third of a crop is all that can be expected from it before the frost, which generally appears the first week in December and destroys the plant for that year. It is also found by those who have cultivated cotton in this State scientifically, that if the crop be kept clear and free from weeds, the grasshopper will not prove to be a very dangerous enemy; for the warmth of the cotton, heated by the mid-day sun, is too much for the gorged insect, and the cooler resting-place which would be provided by the weeds having been removed, he leaves the field. The caterpillar also can be to a great extent kept at bay; for if the field be flooded as soon as this destroyer attacks the plant, the vapour in the day, and the cold evaporation at night, will destroy the insect, so that the planter may expect to reap a good percentage of his crop from the fresh pods, which are quickly reproduced after the land has been irrigated and the caterpillar destroyed.

Tobacco is sown as early as the frost will admit in March, and the leaves are picked during the summer and fall. I saw on the Altar River, in a field belonging to my guide, Van Alstine, some acres of tobacco on the 10th of December, 1867. The plants had yielded two large pickings, and, from the thickness of the leaf, there seemed to be one-third of a summer picking still forthcoming. There had been no frost up to that time, although the altitude was great.

The sugar-cane is cultivated upon the banks of all the

rivers I have named, but it thrives most luxuriantly in the Yaqui, Mayo, and Fuerte bottoms. It is sown every third, fourth, or fifth year, in January or February, and is cut down for sugar every year, in the winter season. The Yaqui and Mayo country is inhabited by two closely-allied tribes of Indians, from whom the rivers have derived their names. They are the most industrious people in the State, and are not by nature warlike. In every town, on every farm, and in many of the mines, they are to be found working diligently for hire; but as they are particularly devoted to agriculture, higher wages is demanded for any other employment. They are tall and athletic, very dark in colour, with a fine expression of countenance. Treaties are held sacred by them, nor have they ever been known to resort to arms, unless goaded on by the cruelty of the Spaniards or Mexicans. Never having had any instruction in agriculture, their own lands—the most productive in the State—are very poorly tilled; and as the rivers are rapid, and the banks for the most part high, irrigation has not been made use of by them as by the Pimas on the Gila, but they have confined their labours to the lowest strips of bottom-land which are subject to overflow, and to stock-farming. Their horses, horned cattle, and sheep, are reported to be far superior to any others in the State. Such cultivation even as these Indians have had recourse to, proves conclusively that the land is productive in the highest degree; and when we consider that frost on the Yaqui is rare and unknown southward, and that the Pacific coast is in close proximity, there is every reason to expect that rice and coffee will grow well there—for both flourish in Sinaloa—and that capital would rapidly develop these regions were not property rendered by bad government so insecure.

Besides these great staples of agricultural wealth, there are others which must not be overlooked. The mulberry tree thrives splendidly throughout the State, and is found in nearly every garden at Hermosillo, for the people here seem to have conceived the idea of raising silk-worms, but to have failed in the perseverance required to carry out the experiment. When the last census of the city was taken, the proportion of females to males was actually seven to one, and of late years this difference has increased. Such a surplus of female population could not be better employed than in the production of silk.

The Indigo plant is indigenous to the Yaqui, and is used by the Indians to dye their blankets with.

This is a great country for fruit—oranges, limes and lemons, dates, bananas, plantains, figs, and grapes, all flourish here, and are of fine quality; while the different varieties of cactus fruits are more highly prized by the people than all the rest, and grow on lands worthless for anything else, as they lie beyond the reach of irrigation. The Pitella (pronounced *Pitayo*) and the Saguaro are the most prized. In the season the Indians live entirely upon them, and gain much money by selling them about the towns. They make a jelly and cheese of the former, and dry them both in the sun for winter use. The Sineta is a small variety of the Pitella. Then there is the Tuna, the delicious fruit of the *Nopala Castiliana*, which gives so much grotesque beauty to the gardens here. From the succulent trunk of the Viznoga an agreeable preserve is made, much used at Mexican tables.

The Mescal (*Agave Americana*) is another production of importance. The rocky, mountainous regions of southern and eastern Sonora are most suitable for its production; it grows, like the cactus plants, on dry barren ground. From the

tough fibre of the leaf excellent mattresses, matting, and ropes are extensively manufactured by the Indians, and used everywhere throughout the State. From the root is distilled the spirit of that name. Mescal spirit of the best quality, matured by age, stands on perfect equality with good whiskey, and is considered, as a spirit, to be very wholesome. If watered by the retailer it is ruined; and if adulterated with the products of the sugar-cane a much inferior article is produced. The process of making Mescal spirit has too often been told to allow of a description here.

Stock-raising in Sonora.

The great advantages which Sonora possesses as a stock-raising country cannot well be exaggerated. Grama stands first among the grasses; next comes a blue, coarse grass, greatly relished by cattle; then follow many varieties; all are perennials, so that in an unusually dry season they do not altogether fail, and the stock are preserved from starvation.

Besides the grasses, there are a great variety of shrubs and bushes that cattle thrive well on and eat with zest. The Mezquit and Paloferro usually yield in early autumn an abundant crop of beans, which are called by the natives Pechita. At this season all the cattle grow very fat. A species of wild sage, which grows in many places, gives the beef a peculiar and delicious flavour much extolled by the epicures of the country. All these dry and nutritious forms of food cover the inland plains everywhere, and furnish so large a supply and variety of fodder that I doubt if any country could feed more stock, acre for acre, than Sonora. In the narrow valleys there grows a weed (it was just coming up

when I passed through the country in the middle of December), the virtues of which, I am told, are very great. If a worn-out horse is pastured on it, his stiffened sinews soon relax. He fattens faster than on anything else, and soon acquires a new lease of life and activity. I met some Americans who were in the habit of buying broken-down horses in the States, and taking them down to Sonora to regenerate them.

The climate is all that can be desired; frosts, in winter, occur over the greater part of the State—a very necessary tonic for the health of the stock. Enough rain falls during the year to replenish the tanks of the stock ranches. The winters are never so severe as to require stall-feeding, nor do the occasional falls of snow lie long on the ground. The food changes with the seasons, and there is always an abundance. No diseases of any kind are known to prevail among the stock north of the line of frost, but farther south, on the rich lands of the Yaqui and Mayo country, periodical epidemics, similar to those of southern Texas, sometimes attack the high-fed cattle. While horses, horned cattle, and goats thrive well on the plateaux, fine wool-bearing sheep will prove remunerative in the mountain regions only, because the heat of the mid-day sun has been found to thin the fleece.*

Many districts were once famous for the enormous quantity of stock raised by the rancheros. Amongst these were San Pedro, San Bernardino, and Bucuachi, in the north-east; Altar and the country north of it; Norea, Cruces, and La Posa, north of Hermosillo; and many other places where not a head of cattle is now to be seen. It was pitiable to ride, day after day, for many hundred miles through magnificent

* Sheep-farmers of South Australia may think the last remark an error. Some varieties may be able to stand the heat without injury to the fleece.

grazing-lands, covered as far as the eye could reach with thick, short, delicate grasses, so sweet and nutritious, and never to see even the hoof-print of any kind of stock. The whole of northern Sonora may truly be said at the present time to be completely swept of cattle. What the Apaches left were taken to supply the contending armies. With the cattle went the people, driven by fear into the towns and larger villages; so that now the ranches are deserted, the orange-groves grow wild, and the few stray cattle which now and then flee at the approach of the traveller have long lost their masters. So depopulated are these vast grazing regions that even the Apaches have ceased to visit them, for there is no plunder to take, no animals to drive away.

Under the protection of a strong government what a paradise this country would be to the stock-farmer! Not obliged to roam about in search of fresh grass and water, he can choose a suitable place for his stock-ranche, and dig his tank in a hollow to which drainage sufficient could be directed to fill it; no covering being necessary for the stock, he can confidently rely upon the variety of pasturage, and the succession of natural crops to keep his cattle always well supplied with food.

The Mineral Resources of Sonora.

Almost the whole of this State is remarkable for the widespread distribution of its mineral wealth. There is scarcely a hill that does not show signs of gold, silver, or copper ores —scarcely a brook that will not yield to the miner the colour of gold. But how large an extent of country, or how many localities are likely to prove sufficiently rich in minerals to pay, is a question impossible at present satisfactorily to answer.

The general character of the veins about the boundary line and in northern Sonora is, that they are narrow, often very rich, generally very numerous, but capricious—giving out, or changing their direction so continually, that the miner can never feel certain of his prospects beyond what he actually sees as day by day he develops his mine. There are some exceptions to this, such as the large masses of mineral giving a low percentage of precious metal which are situated about the head-waters of the Rio Santa Cruz, forming what is called the Santa Cruz mining district. To develop this region, many mines were opened, called the French, the Empire, Boundary, Patagonia, &c. The ores yielded but thirty dollars of silver per ton. They were so easily reduced (being argentiferous galena), that mining prospered here until the troops were withdrawn at the breaking out of the American civil war, and the region was left to the mercy of the Apaches, who nearly succeeded in massacring those who were working the Patagonian Mine, drove off the stock, and made mining for a time impossible. Much fine machinery now remains idle; for up to the present time the miners have not resumed work.

A second district (the Cababi), situated about sixty miles west of St. Xavier del Bac, has now about six mines being worked upon it. The ore is the black sulphuret of silver, and yields an average, including first, second and third grades, of 100 dollars per ton.

A third district is called the Tucson district: it occupies the mountains immediately to the west of that town. The ores are very rich; but the veins are thin and capricious.

In the Santa Rita Mountains there is a fourth district of the same name (Santa Rita). Silver mines were opened here; but since the manager, Mr. W. Wrighton, was killed

by the Apaches, all work has ceased. The largest enterprise was that which led to the opening of the Colorado Mine, and caused the erection of the twenty-stamp mill and other machinery now standing at Enviguetta, which I have already mentioned. Mismanagement and extravagance brought this company to ruin.

The above districts are all in United States' territory. They represent the first abortive attempt at silver mining in the south, and tend to show that the natural disadvantages peculiar to these regions are at present almost too great to be overcome. Labour and provisions are high, the expense of transporting and putting up machinery is enormous, water is scarce; but for all that the silver is there, and will eventually be got at.

In forming a true conclusion as to the value of the mineral resources of Sonora, the history of its mining operations is a very necessary part of the evidence. Sonora and Sinaloa, under Spanish rule, were one State, and had their base of supplies, not at Guaymas, Agiavanpo, or any harbour on the Pacific coast, but at Vera Cruz. From this far-distant port, all the supplies sent from Old Spain to the settlers—everything, in fact, that they required—had to be packed on mules, a distance of 2,000 miles, first to the city of Mexico, thence along the great military road to Chihuahua, across the Sierra Madre *viâ* Concepcion, to Arispe, the then capital of Sonora, where the troops were paid, and from which point supplies were distributed to the military posts and missions scattered all over the country. But notwithstanding the remoteness of the province from its base of supply, the Spaniards during nearly a hundred years of peace, and under the protection of a strong military government, carried on their mining and agricultural operations most vigorously, discovered most of

the large rich veins throughout the country, and worked them to a very considerable extent.

The government exacted from the miner five per cent. of the gross produce of his mine; and gave him military protection in return. But the Spaniard, although the Indian population afforded him abundance of labour to work the mines, had neither machinery to use when the water-level had been reached, nor the knowledge necessary for reducing the rich sulphurets which he was pretty sure to encounter at that point.

The system of reduction known as the "patio" worked well in the reduction of the free ores which had been oxidised above the water-level; but other systems of reduction being there unknown, the mine was generally abandoned when the water-level had been reached. Even the necessity of abandoning the mine before it was half worked out naturally led to the discovery of a greater number of veins and a more thorough investigation of the mineral resources of the district; and thus the whole country was thoroughly prospected. No capital was used to develop the mine, no tunnel was bored to drain it; but still, with the croppings alone to represent the capital, and the Indian slaves, the labour and machinery, the production was far greater than it has ever been since, or probably will be for many years to come. This was the state of the mining interest up to 1827, when all the energy, ability, and capacity for organization was suddenly withdrawn from the country when the Spaniards were banished by the new-born Mexican Republic.

When the mushroom creole aristocracy sought in the mines for the wealth which had made their Spanish masters so enviable, knowing nothing in most cases of mining, they left the management of it to others, squandered the proceeds

when the vein was productive, and reserved nothing for the future when unremunerative work should become necessary; and thus many fine mines were abandoned when a small expenditure would have again made them profitable.

Besides the indolence, extravagance, and ignorance of the new owners, a second blow fell heavily upon the mining interest—the withdrawal of troops from the frontier provinces to take part in the intestine strifes nearer the centre. The Opitas rebelled and caused much damage to the mining districts of the north-east; the Apaches discovered how things were, and poured down from the north in larger hordes than ever.

The third adverse influence was the work of the Gambosinos. Under the mining laws of New Spain, the miner was obliged to support his mine by leaving a sufficient number of pillars (formed of ore not removed) to ensure its safety; but under the Republic no laws could be enforced, and when the mines became abandoned, they immediately fell a prey to the Gambosinos (men who worked in companies, but each for himself), and as the pillars came first to hand, and yielded immediate returns, they were removed, and, in consequence, down came the walls, burying beyond reach the unexhausted treasures of the mine itself. Thus it is that most of the old mines of this State, the best and most productive, having enriched their original owners and being still unexhausted, are now mostly buried under their own ruins. Notwithstanding this, the general opinion amongst those who are capable of forming one is, that the path which leads to the most important mineral deposits is sure to be found by following, to a great extent, the footsteps of the Spanish miners. They found the best veins, and would have increased the production of silver year by year, had they not

been driven away, leaving for others mines which are only half developed, and which contain their precious metals in the best possible form, now that we know how to manipulate them—I mean as sulphurets. But to get at these it is necessary that capital should be expended which cannot at the outset be remunerative, for a tunnel to drain an old mine cannot be bored in a day, much less can the débris be cheaply removed. When Sonora becomes Anglo-Saxon there will be some hope for the future—until then, there is none.

The following are the chief districts in which silver mining has been or is still carried on.

1. Alamos, in the south.
2. Barojica, between Rios Yaqui and Mayo.
3. Santa Juliana, near Los Cedras.
4. San Marcial, on the Rio San José.
5. San Xavier.
6. Los Bronces,
7. San Antonio de la Huerta. } Upper Yaqui.
8. La Barronca.
9. San Juan de Sonora.
10. Babicamora,
11. Banawachi, } in north-eastern Sonora.
12. Nacasari,
13. Zubiate, forty miles south-west of Hermosillo.
14. Aquagu (Minos Prietos).
15. Alameda.
16. Zaric, Rio Altar.
17. La Cieneguita,
18. Mulatos, } between Saguaripe and Jesus Maria, in the
19. Jerva Buena, } Sierra Madre.
20. La Cananea,
21. Soyopa, Rio Yaqui.
22. Limposos.
23. Carrigole.
24. La Dura, Rio Chico.
25. Relitos.
26. Tecoripa, twenty miles west of San Antonio.
27. Batopilas,
28. Chimipas, } head-waters of Rio Fuerte.
29. Urique,
30. Bucuachi.

Outside these districts scattered ledges of gold or silver

bearing quartz are of course to be met with, and there are many insignificant localities not named in the above catalogue; for almost every ranche has some favourite mine near it, the boundless wealth of which forms part of the belief of the inhabitants, who, however, seldom show energy enough to put their belief to the test.

The above districts are subject, according to their position, either to the mint at Hermosillo, or that at Alamos, in the southern part of the State. The average amount coined at these establishments during the five years preceding the Maximilian war was about 60,000 dollars per month at each mint. During the war, that is for nearly three years, both mints were stopped, and since that time Hermosillo has been coining about 30,000 per month, Alamos, 60,000, with every probability of an increase to 70,000 or 80,000 dollars in a few months' time, on account of the productiveness of some mines recently taken up in the vicinity.*

1st. The district tributary to Hermosillo.

The Bronces and Trinidad mines, besides the Nahuila worked with the Bronces, are owned by a Mexican, Matias Alzua by name. The former, from January to November of 1867, furnished 83,000 dollars to the mint; the latter, 15,500. In both, all the rich ores were sent to Europe for reduction. The Bronces and Nahuila supply a mill of twenty stamps, but they could keep twenty-five stamps always employed. The Trinidad supplies a fifteen-stamp mill, which ought to be increased to twenty. The El Taste Mine (Tecoripa district), worked by an American company, sent, up to November, 1867, 38,000 dollars to the mint. A ten-stamp mill is equal

* The particulars here stated were gathered from persons on the spot in December, 1867; I have especially to thank Mr. Johnson of San Marcial, and Mr. Simons, part owner of the mint at Hermosillo, for rendering me so much assistance in obtaining reliable mining information.

at present to its requirements. There are several mines and mills lying idle in this district, some from mismanagement, some for want of ores. The San Marcial American Mining Company has sent, in the last two months of the same year, 17,000 dollars from their ten-stamp mill. The Governor's mine at Banawachi has sent this year, up to November, 15,000 dollars from its twenty-stamp mill. In the Babicamora district, below Arispe, a Mexican is erecting a mill, which promises to be remunerative, as much silver was formerly obtained here by the old patio process. At La Dura (Rio Chico) a Mexican company is commencing work. Then La Barronca (San Antonio de la Huerta district) produced considerable silver for two years, but this has been temporarily arrested while a tunnel is being made. At Chipionena an American company is also commencing work. At Zubiate a Mexican company sent 30,000 dollars to the mint in 1867, and expected to double that amount in 1868. The mill works fifteen stamps. Besides Banawachi, Governor Pesquera has a mine at Cananea (three days' journey north of Arispe), of lead, silver, and copper. This was a good mine, but having been abandoned during the revolution, the Apaches burnt the steam engine and destroyed the smelting works. Santa Theresa and Los Ginga of Zuape are both good mines, and worked to advantage. The yield of the above veins, taking an average of all the ores, is about the following:—

	Dollars per ton.
Bronces	50
Nahuila	150
Trinidad	150
San Marcial	100
El Taste	100
Chipionena	60
Zubiate	50
Banawachi	35, 17½ of silver and 17½ of gold.
Babicamora	60, also partly gold.

2nd. The southern district, tributary to Alamos.

There is no district in the State to compare in importance with that of Alamos. The two great veins, if they are not the same vein, are the Promontoria and the Tirte.

The Promontoria Mine belongs to the heirs of Almuda, and has produced many millions' worth of silver. Before the late war, the owners were in treaty with an English company to sell the mine for 150,000 dollars. It was then full of water, and could not be thoroughly examined. Since then an American company, which bought the Tirte Mine, has, by driving a tunnel, completely drained the Promontoria, and I have since heard that the English company are again prepared to bid for it. The famous old mine, the Dios Padre, is also on the same vein, and is being reopened by an American company. The vein upon which these mines are situated is fourteen yards in thickness, and all metal, yielding an average of from sixty to eighty dollars to the ton. The ore is black sulphuret of silver. Eighteen leagues from Alamos is situated the famous mine of Don Miguel Urrea—the Palmarejo. This mine, by the Mexican process alone, can still produce 30,000 dollars per month, whilst one thousand "barreteros" can work at one time in the passages of its "labores." A mine bought for 150,000 dollars by the English company which is in treaty for the Promontoria, and situated at Uruachi, is yielding large quantities of silver, and quite equals the expectations of the owners. A new silver mine has recently been discovered near Soyopa, on the Rio Yaqui, the ores of which are abundant, and yield by the simplest Mexican process of amalgamation, without need of roasting, from 400 to 800 dollars per ton.

Alamos also receives silver from Batopilas (in which district there are no less than six hundred distinct veins), Jesus Maria,

Juaguparis, Chinipas, Urique, and several other smaller districts in the mountains about the borders of Chihuahua and the heads of the Rio Fuerte.

Besides the silver contributed by the few prominent mines already referred to, there is a considerably less, though appreciable, amount brought in driblets by the Mexican mining population inhabiting chiefly the districts named, who support themselves by this means. These people, chiefly Gambosinos, are the best possible judges of ores, but the worst possible hands at their reduction. As, however, the mineral wealth of the State is so diffused, and as there are such countless numbers of narrow rich veins, an indefinite increase of silver might be supplied from this source, if the country were cleared of Apaches and robbers, and the miners enabled to work in peace.

As a gold-bearing State, Sonora has not become as yet conspicuous. The production has never averaged more than one-seventh in value that of silver, and of late years has seldom exceeded one-twelfth. There are not three stamp mills crushing gold quartz in the State. Placer mining is carried on chiefly by the Indians in different places all over the State, but only during the wet season.

Some of the chief districts for placer mining are—

Los Llanos, near the main road from Hermosillo to Altar.
Metape, eighteen leagues from Ures.
La Brisca, near Arispe.
Bucuache, ,, ,,
San Antonio de La Huerta, Rio Yaqui.
La Bonanata, near San Marcial.
Barajita, south of Santa Anna.
La Sombrareta, west of Zarie.

The question of coal supply to the Pacific coast is one of the greatest possible importance. There are many places in California where lignite and inferior coals come to the surface;

the most important of these districts is the Monte Diablo basin, near San Francisco. The best proof of the quality of this coal is that the annual production has not yet reached 100,000 tons; it is only fit for consumption in private houses and for a few other purposes. All the coal used for shipping, blacksmiths' forges, steam engines, &c., is imported into San Francisco from Vancouver's Island, where there is an abundance of the best qualities.

Now in Southern Sonora the true carboniferous strata are to be found, and with them an abundance of coal. It lies, unfortunately, too far from the sea-coast to be of any practical value at present; still it is there. I examined specimens from several localities, but cannot say much for the greater number. San Marcial, sixty miles from Guaymas, is the nearest point to the coast where large quantities are to be found. What I saw from that place, however, was not good. The good coal lies far away in the interior, upon both sides of the Upper Yaqui River, and from some spots there I obtained specimens equal in every respect to the finest coal of Newcastle or Pennsylvania. The future of Sonora depends, of course, greatly upon her coal. There can, in fact, be no doubt but that Sonora contains much mineral wealth; she cannot vie with such States as Guanaxuato or Zacatecas, nor have any veins been yet discovered equal to that of the Real del Monte, the Sombrerete, or La Luz; but so uncertain is mining, and so little known is Sonora, that, any day, some Vita Madre or Vita Grande may be discovered which will rival those of the above-named States.

As regards her sister State, Chihuahua, it was my opinion on leaving Mexico that the eastern State was the richer of the two; the mineral wealth is more concentrated, and some of the veins near the city of Chihuahua, although abandoned

now, were enormously productive. I read with great interest Mr. Charles Sevin's paper on the mines of Chihuahua, in the "Journal of the Royal Geographical Society for 1860." Here much valuable information will be found on this subject.* The only other information on Chihuahua I can name is to be found in "Dr. Wislizenus' Tour to Northern Mexico, 1848 (30 Congress, No. 26)." These reports confirm me in my belief that Chihuahua is a State of no ordinary merit, and surpasses Sonora both in mineral wealth and fertility.

The absorption of the four northern States of Mexico by the Great Republic will be a real gain to the civilised world, and ought to be a source of unfeigned congratulation to all branches of the Anglo-Saxon family, as a fresh and valuable addition to their territories. No nation understands the "development" of a new country so thoroughly as the Americans; and they know well what they are about. The time has not yet come when this rich addition of territory can be quietly and inexpensively absorbed into the Union. A

* "Santa Eulalia," says Mr. Sevin, "a little town of 1,500 inhabitants surrounded by several hundred mines, is only five leagues distant from the town of Chihuahua, where ever since 1703 the ores have been transported for their metallurgical treatment, the situation of the mines themselves being rather unfavourable for that purpose. By the immense wealth thus concentrated at Chihuahua, the population of this city, now reduced to 12,000 inhabitants, was raised at one time to 76,000. In the space of ten square leagues more than two hundred mines have been worked, and upwards of fifty of them have been sunk to the depth of 200 yards. Some of them are so extensive that a whole day will not suffice to see the different parts of one alone.

"With regard to the immense amount of silver extracted from these mines, the following statements will be found interesting. At the most flourishing time a contribution was raised of two grains of silver from every marc ($\frac{1}{2}$ lb.) extracted, for the purpose of building two churches. They were built in a few years; the cost of one was 600,000 dollars, that of the other 150,000, and a surplus remained of 150,000 dollars. Thus the contribution amounted to 900,000 dollars, and represented an amount of metal equal to 145,000,000 dollars extracted from the mines of Santa Eulalia in the course of a few years.

"In the year 1833, a census of the whole amount was made, and it reached to 43,000,000 marcs of silver, or 430,000,000 dollars" (a dollar = 4*s*. 2*d*. in silver).

trans-continental railway must first be completed through the southern territories of the United States; there must be a fair sprinkling of American settlers scattered throughout the States to be acquired, so as to lead the people in the paths of enlightened republicanism; and the Mexican population, at present ruled by Congress, must be more firmly united to the Americans by the bonds of political freedom. All this I am confident will be done in time, and a very few years will elapse, after the boundary line has been again moved southward, before we shall find railroads traversing the country—a line to Chihuahua, another to Guaymas, or, still better, to Toquivampo or Mazatlan, and a third, perhaps, entering from southern Texas. Then will follow a rapid increase in the production of the precious metals, a result which directly affects all nations burdened with a heavy national debt.

Sonora and Sinaloa, with a fine healthy climate of which States farther south cannot boast, situated, moreover, along a coast well supplied with harbours, and having an industrious Indian population accustomed to labour, should hold a similar position towards the Pacific States, as the South naturally occupies towards the North. All the semi-tropical productions, such as rice, sugar, coffee, indigo, cotton, and tobacco, should here be grown for California and the Northern Pacific; while mining machinery, merchandise, and all the luxuries which accompany Anglo-Saxon civilisation, would form the obvious articles of exchange. Thus, although the present is a day of darkness to them, there is more promise in the immediate future for these northern provinces than for any other part of the Mexican Republic.

CHAPTER XI.

HOW THE SURVEYORS FARED ON THE 35TH PARALLEL.

Alone in San Francisco.—Arrivals.—The Surveyors on the 35th parallel.—El Moro.—Spanish Inscriptions.—Dr. Parry at Zuñi.—Sierra Madre.—Colorado Chiquito.—Mount Agassiz and the San Francisco Peaks.—*General Palmer's Narrative*:—Difficulties of a Cañon country.—Sycamore Cañon.—Indian Attack.—Scaling the Walls.—Attempt to skirt the Cañon above.—Failure.—Again enter the Cañon.—Night.—Firing into the fire.—Camp at last.—The fate of Signor and Don.—Lessons taught by the Fight.

WEEK after week passed slowly away at San Francisco; I was quite an invalid, and thereby learned to appreciate perhaps more thoroughly than I otherwise should have done, the advantages of some of the institutions of America; and that too without any expense, for I was very short of money at the time, having carried as little as possible with me through Mexico. I became member of a first-rate library, where, amongst other luxuries, the English journals and daily papers regularly arrived. Every morning I searched the provincial news of the south to get a glimpse at the progress of our surveyors. But with the exception of finding that three of my friends, General Palmer, Major Calhoun, and Dr. Parry, had reached Fort Mojave on the Rio Colorado, and that the centre of California was impassable on account of the floods, not the slightest clue could I discover as to their whereabouts.

It rained for three weeks day and night incessantly; it was too sultry for warm clothes, too damp for cool ones; yet I must confess that San Francisco, even when seen to the

Vincent Brooks Day & Son, lith

SURVEYORS AT WORK

greatest disadvantage, as I saw it, is one of the pleasantest cities in the world. It is the least American city in the States, and yet it has all that is good of American institutions. Cosmopolitan of course it is. Every morning I had my boots blacked by an African, my chin shaved by a European, and my bed made by an Asiatic; a Frenchman cooked my dinner, an Englishman showed me to my seat, an Irishman changed my plate, a Chinaman washed my table-napkin, and a German handed me my bill. But of this delightful city I will not say a word; an old college friend of mine has already given the public so vivid a sketch of San Francisco, so full of thought, vigour, and truth, that nothing remains for me but to render to Mr. Dilke my best congratulations on the complete success of his delineation.

At the end of the seventh week, my own party arrived by sea from San Pedro; two days later, another came in from the 35th parallel; and the next morning, when I went from my hotel, the *Cosmopolitan*, to hear the latest news at the *Occidental*, in came five of the shabbiest-looking fellows I ever saw. Their coats were torn, their caps washed into shapeless mushrooms of felt, their faces tanned and bearded, and their figures covered with mud; these were Palmer, Colton, Calhoun, Parry, and Willis; all my old friends had arrived together. What congratulations we had! How we startled the "Frisco" dandies who were languidly perusing the morning papers; with what determination they (Palmer and party, not the dandies), sat down to breakfast while the waiters covered the table with the choicest fare of the best hotel in the States; and how they enjoyed that first "square meal" of civilization!

The festivities, the convivialities, the cocktails, and the punches which followed, soon instilled new life into me, and

enabled me to shake off the dregs of a fever which seemed until then determined to keep me down.

As may be imagined, so much was said about the surveys, that those who had been on the 32nd parallel almost fancied they had traversed the 35th also, and those who had devoted their energies to exploring the Colorado Chiquito, felt that they knew just as much about the Gila. For my own part I can scarcely believe that I have never read the Spanish inscriptions on El Moro, or tried to trade, like Dr. Parry, with the Indians of Zuñi, or that I did not form part of Palmer's little band when they were attacked by the Apaches in Sycamore Cañon; that the San Francisco peaks and the lovely parks around them have only as yet been seen with the eye of fancy; and that James White, the hero of the Great Cañon, did not tell his wonderful tale to me. On the way back, when Palmer, Colton, and I recrossed the continent by stage through Salt Lake City, we worked out together many of the little problems in physical geography which I have mentioned in this book, and killed the monotony of the dreary hours by comparing notes of our different journeys.

I devote this chapter to a brief notice of some of the most interesting features met with by the surveyors on the 35th parallel. The region they traversed was far richer in objects of interest than that farther south, by which I completed my crossing of the continent. My original intention was to have taken this more northern route, but a doctor was wanted on the 32nd parallel, and as a professional photographer arrived from the States just in time to accompany the parties on the 35th parallel, I found it advisable to alter my plans, and to become doctor and photographer of the southern half of the expedition.

I shall not describe the different routes taken by the

LOASACEÆ.

NYCTAGINACEÆ.

SOLANACEÆ.

MENTZELIA ORNATA, TORR.
(One-third natural size.)
Stamen natural size.

ABRONIA CYCLOPTERA, GRAY.
(Two-thirds natural size.)
Fruit natural size.

DATURA METELOIDES, DUNAL.
(One-third natural size.)
Seed natural size.

separate parties, for such an attempt would fill a volume instead of a chapter, but I shall relate, with the help given me by my friends who were present, the most interesting adventures met with on the way, and shall sketch here and there the country traversed by them.

Whilst two parties were surveying north of the bold volcanic cone, San Mateo (Mount Taylor), west of the Rio Grande, and exploring Navajo Pass (Campbell's Pass), the third was travelling south of the mountain; visiting the interesting pueblos of Laguna and Acoma, examining Inscription Rock, which the Spaniards named El Moro, and making the acquaintance of the Aztec Indians of Zuñi.

On approaching Inscription Rock you are struck with its wonderful resemblance to a Moorish castle, and acknowledge at once the justice of the old Spanish name. It is—as may be seen by the engraving, an exact copy of a photograph taken by our professional artist—sufficiently large to be a fine landmark for the surrounding district, and it is fortunate for us all that the earliest Spanish pioneers thought so too, for they have engraved their names and the dates of their expeditions on every side of the rock, leaving behind them a record of events, some of which would otherwise have been entirely lost to history. Close to the left hand corner, almost hidden by the brushwood, is the most ancient date of all.

"Don Joseph de Basemzeles, 1526."

Arranging the inscriptions in chronological order, and using the translation furnished by Lieutenant Simpson in his report, we find the following:—

"Passed by this place with despatches . . . .
16th day of April, 1606."

"J. Aparela, 1619 (hieroglyphics not decipherable).

"Governor and Captain-General of the Province of New Mexico, for our

Lord the King, passed by this place, on his return from the Pueblo of Zuñi, on the 29th of July, of the year 1620, and put them in peace at their petition, asking the favour to become subjects of his majesty, and, anew, they gave obedience; all which they did with free consent, knowing it prudent as well as very Christian . . . . (words effaced) . . . . to so distinguished and gallant a soldier, indomitable and famed, we love;" . . . . (remainder effaced).

"JUAN GONZALES, 1629 . . . . MANUEL . . . . " (probably Francisco Manuel).

"Passed this place, Sergeant Major, and Captain JUAN ARCHULETA, and the traveller DIEGO MARTIN BARBA, and Second Lieutenant JUAN YNES JOSANO, in the year 1636" (hieroglyphics).

"ARITOMA GON SALEZ, in the year 1667 . . . . country of Mexico, in the year 1632. Folio . . . . BENGOSO, by order of Father LEBADO LUJAN."

"Here passed General DON DIEGO DE BARGAS, to conquer Santa Fé for the royal crown, New Mexico, at his own cost, in the year 1692."

"In the year 1641 BARTOLOME ROMELO . . . ."

"ANTONIO B . . . . DON FRANCISCO . . . . for the impossibility . . . . JENE . . . . there to subject; his arm undoubted, and his valour, with the wagons of our Lord the King, a thing which he alone did—E. FECIO DE ABTOSIO—six hundred and twenty-nine" (probably intended for 1629).

"In the year 1696 passed D. M." (hieroglyphics).

"Captain JUDE VUBARRI, in the year of our Lord 1701."

"JUAN GARCIA DE LA RIVÂS, Chief Alcalde and the first elected of Santa Fé, in the year 1716, on the 26th of August. By the hand of BARTOLO FERNANDEZ ANTONIO FERNANDEZ MORO."

"AUGUSTINE DE YNOJOS."

"In the year 1716, upon the 26th day of August, passed by this place DON FELIX MARTINEZ, Governor and Captain-General of this kingdom, for the purpose of reducing and uniting Moqui . . . ."

"Licentiate Chaplain Friar ANTONIO CAMARGO, Custodian and Ecclesiastical Judge."

"SIMON DE SALAS."

"ANTONIA NOMOYA."

"On the 14th day of July, of the year 1736, passed by this place General JUAN PAEZ HURTADOR, Inspector; and in his company, Corporal JOSEPH ARMENTA, &c."

On the 28th day of September, in the year 1737, arrived at this place the illustrious Doctor DON MARTIN DE LIZO COCHEA, Bishop of Durango, and on the 29th left for Zuñi."

"JOSEPH DOMINGUEZ passed by this place in October, and others, September 28, with much caution and some apprehension."

There are many other Spanish names of later date and less interest.

Vincent Brooks Day & Son Lith.

EL MORO. (INSCRIPTION ROCK.)

When Lieutenant Simpson added his own name, and that of many of his party, to the above inscriptions, on September 18th, 1849, there was only one previous inscription in English, this was:—

"O. R., March 19, 1836."

Since then, Whipple's expedition and the names of many of his party; Beal's expedition, and the names of some of his companions; many more names of Californian volunteers; and, lastly, the chief names connected with the present survey of the U.P.R.W., E.D.,* have been added to the list; so that now, what with Indian hieroglyphics and English names, the old historic ones are harder to decipher than ever.

I heard some curious stories about the behaviour of my friends Dr. Parry and Major Calhoun during the few days they were encamped at Zuñi, which is situated but a few miles west of El Moro. Their love of science and Indian curiosities had led them, I believe, to invest about one hundred dollars whilst at Santa Fé in things which they thought would be most prized by the Indians to be met with on the way. With great difficulty they had succeeded in transporting their goods and chattels to Zuñi, and here they determined to unfold their rich treasure to the envious eyes of the untutored savage. They wanted to exchange their sham *bijouterie*—radiant with the largest diamonds and brass—and their fine linen made of cotton print, for the embroidered robes, weapons, native implements, and other objects of Indian vertu possessed by the Zuñians.

These good people, however, did not seem to relish the exchange; nose-rings, ear-rings, and other adornments, produced not the least effect upon them; even Calhoun's best speeches failed to raise the bartering emotions of the tribe.

* Then the Union Pacific Railway Company, Eastern Division.

The doctor had broken down his favourite mule by the length of his geological rambles, but he failed to obtain a substitute in the shape of a pony from the Indians. They accepted his gifts with much apparent gusto; they willingly —rather too willingly—accompanied him in his search for fossils and flowers; they exchanged their corn for goods when a very advantageous offer was made them, but everything of value they kept to themselves.

Our party only succeeded, after infinite bargaining, in obtaining two small sheep out of their numerous herds, and left, fully persuaded that the Zuñians were the "smartest" traders west of the Mississippi.

Zuñi is situated fifty miles to the west of the dividing ridge of the continent, called in consequence the Sierra Madre; the divide is crossed *viâ* Navajo Pass at an elevation of 7,177 feet, through Zuñi Pass at 7,926. Much coal crops out in many places on the way to Zuñi from the Rio Grande valley, and the country about this pueblo is very beautiful and fertile, producing abundance of fruit, chiefly peaches, and large crops of maize, without irrigation.

The western slopes of the Sierra Madre are considered by General Palmer to be infinitely superior in every respect to those of the Wahsatch Range, which the Mormons have colonised for several hundred miles with a population amounting to 100,000 souls, converting that so-called desert into plantations, orchards, and fields of waving corn.

About one hundred miles west of the continental divide the main line reaches the Colorado Chiquito, and follows the valley for about fifty miles; for which distance it varies in width from one to three miles, and possesses a rich alluvial soil, with abundance of running water for irrigation. Then comes a short cañon, above which the valley is fertile and

beautiful, varying in width from three to five miles, for fifty miles farther, when it is merged in a huge cañon which extends with unbroken walls to the Rio Colorado.

Leaving the valley of the Colorado Chiquito, the line next passes for one hundred miles through the most beautiful country on any part of the route from Kansas to California.

To the south lie the Mogollon Mountains, thickly timbered and well watered; towards the north and north-west extend the parks and grassy plateaux from which the San Francisco peaks rise so superbly. Winter and summer the whole country is thickly covered with nutritious grasses; the soil is black and rich, from the decomposition of the lava that has been ejected in immense quantities from the extinct crater of Mount Agassiz and its three companions, and is capable of producing, without irrigation, wheat, barley, oats, potatoes, and all temperate produce in abundance. This is the country of which Beal—himself a great traveller—declares, "It is the most beautiful region I ever remember to have seen in any part of the world. A vast forest of gigantic pines, intersected frequently by extensive open glades, sprinkled all over with mountains, meadows and wide savannahs, and covered with the richest grasses, was traversed by our party for many successive days." (See Frontispiece.)

The most attractive place of summer resort on the line of the road will be here on the slopes of Mount Agassiz. It has every attraction—scenery, sky, water, elevation, climate; and proximity to the greatest natural curiosity known on the American continent,—the Great Cañon of the Colorado, from which it is distant some forty or fifty miles.

The streams which flow from the San Francisco peaks into the Rio Verde, a northern tributary of the Gila, cut their several ways deeply into the plateaux lying to the southward

over which they pass, thus forming innumerable cañons which bar the way westward in the less elevated and apparently smoother country below their mountain-sources. It was not the wish of our surveyors to carry a line of railway over the actual base of the San Francisco peaks at an elevation exceeding 7,000 feet for 100 miles, if a lower grade could be obtained farther south. With this object in view, General Palmer, after having pushed rapidly forward in advance of the parties to Prescott, determined to retrace his steps through this intricate cañon country, and ascertain if there was any possibility of finding a practicable route through it. He was accompanied during these excursions by Hinchman, whom my readers will remember as one of my companions in the earlier chapters; and he had also a small detachment of soldiers and a few more members of the survey to assist in the work; at one time General Gregg, who happened to be at Prescott, joined him with his escort. As General Palmer has himself furnished me with a short account of his adventures whilst conducting these reconnoissances, written on the spot with all the freshness which the vivid recollections of scenes just passed alone can give, I will tell the story in his own words:—

Camp in Signal Cañon, Eastern Foot of Mogollon Range,
near San Francisco Mountain.

Arizona, Dec. 8, 1867.

After climbing and scrambling among these mountains for more than two weeks since leaving Prescott, endeavouring to find a route eastward to the Colorado Chiquito without passing over San Francisco Mountain, I have at last reached the valley of that river, and am waiting here in camp this pleasant December Sunday for the return of Hinchman, whom

I have sent down the river to get news if possible of Greenwood's whereabouts. Hinchman will probably find a mound there with a letter buried, containing an account of Greenwood's movements, and stating where we can find him. We have two signal fires burning on the highest points overlooking our camp to guide Hinchman to us, and from this we have called the tributary of Cañon Diablo in which we are encamped, "Signal Cañon." I have called it a camp, but it is only a "high-toned" bivouac, as we parted with tents and wagons a fortnight ago, and since that time have relied on pack mules, and even these have been unable to cross the rugged country through which this reconnoissance has been made without sacrificing some of their number to the good of the cause.

Last Monday, for instance, at the close of the day, while following an old Indian trail across one of the Mogollon ranges, suddenly, without the least previous indication, there yawned at our feet one of those fearful chasms—the terror of all tired travellers, when they think a few more miles of gentle march will bring them to a good camping spot—which are here one of the great characteristics of the country. If "unexpectedness" be one of the elements of romantic grandeur in scenery, this gulf of brown and grey rock has high claims for pre-eminence in this respect, with its precipitous sides, 500 feet deep, and apparently so narrow that it is at first difficult to appreciate fully the hard fact that, before you can continue your march, it is absolutely necessary to descend to the very bottom, and then, if you can, to ascend on the other side. Perhaps days would have to be consumed in heading the inexorable channel. There is no help for it, and although the tall spruce trees in the bed look like saplings, and the stream of water rushing along

among great boulders resembles a thread, and your head swims as you gaze down from the brink, the course lies east-north-east; and where none but the Apache has ever gone down before, and he on foot, you have to lead your horse, jumping out of his way when he slips and slides on the bare rock, and dodging the loose boulders which are rolled down by the column following you.

It is assumed in this country that wherever an Indian has made a foot trail a pack mule can follow. We expected to come across many such paths, and, after our previous experience, would have been much surprised had we not met some of the trail makers as well as their trails. In the ascent of this cañon by which we are camped there was considerable difficulty. One strong mule, who had nearly reached the top, slipped and rolled over and over till he reached the bottom—dead. Another tumbled nearly as far, but must have had a very steady and well ordered brain, as the moment he struck the river-bed below, he stood up on his feet, and has made a day's march with us since; but we had to shoot him yesterday. A third tumbled half-way down, and is an ugly spectacle, with his gashed eye and flank, but is marching along all right now, doing regular service.

But very few days have passed since leaving Prescott in which we did not meet recent signs of Indians; the rude wigwams of bunch grass and branches, which the Arizonians call "wicky-ups;" the moccasin tracks; the mescal heaps, where the Indian has been roasting his supply of winter subsistence, composed almost entirely of this root; the sweating-house or earth oven, which he gets into when sick, and which is almost his sole remedy for disease; the fresh trail, and the "rancheria," or village of a greater or less number of wigwams.

We have been surrounded by these constantly, but all were abandoned; and although the stealthy Apache was watching us from every rocky look-out, we could nowhere catch sight of him. An inexperienced traveller would have imagined that there had been a general exodus, and that the whole race had disappeared—had gone to the Tonto basin, or the Gila, or some remote hiding-place.

If he wanted to have this mistake corrected, he should have done as we did: he should have gone down into a cañon and travelled along its bed for a few miles, until he had reached a place where you can look up on either side and not discover the remotest chance of getting out—where ahead, and in the rear, as far as you can see, it looks like a deep grey coffin. Then suddenly he would hear a war-whoop that would make him think that all the savages in the Rocky Mountains, from Fort Bridger to Apache Pass, were within bow-and-arrow range.

A week or two ago, on an occasion very similar to the above, General Gregg was with me. We were hunting for a route from the Val de Chino, eastward to the Colorado Chiquito, by crossing the head-waters of the streams flowing into the Rio Verde close up to where they emerged from the high rocky wall at the base of the San Francisco Mountains, when we came to the cañon of Sycamore Fork. We succeeded in descending the gorge; but the ascent was so exceedingly steep, that we thought the pack-train could not climb up out of it; and concluded, in spite of its violating the fundamental rule of Indian warfare in these mountains, to return to the bed of the cañon and follow it to its mouth.

It was strewn with fragments of red sandstone, from the size of a church to that of a pebble, over which we dragged our foot-sore animals very slowly. We had made some eight

miles when, as it seemed, at the roughest part of the whole way, where nature had made a sort of waste closet at random for all the shapeless blocks and sharp-cornered masses of rock and washed-out boulders that she had no time to work up and wished to hide from sight, we suddenly heard a shot from the brink of the cañon at our rear, and the dreaded war-whoop burst upon us. Then we looked up to the right and left, ahead and to the rear; but the walls seemed everywhere as tall as a church-steeple, with scarcely a foot-hold from top to base. They had looked high before, and the chasm narrow, but now it seemed as though we were looking up from the bottom of a deep well or a tin-mine, and no bucket to draw us up by. Soon the shots were repeated, and the yells were followed by showers of arrows. We staggered and stumbled, about as fast as a very slow ox-team, along the rocky bed, till we came to some bushes, and then stopped.

Some of the Indians had got on the edge of the cañon ahead of us, whose yells answered those from the rear; and the whole concatenation of sounds echoed among the cliffs till it seemed to us that every rancheria in Arizona had poured out its dusky warriors to overwhelm us.

It was a yell of triumph—of confidence. It appeared to say, "Oh, ye wise and boastful white men, with your drilled soldiers and repeating guns, and wealth and power, who came out to hunt the poor Indian from his wigwam, look where we have got you! We have only been waiting for you to make some blunder; now we shall take advantage of it, and not let any of you escape. It shall be worse than at Fort Kearney, for not even *one* shall be spared to tell the story. It will be a good place to bury you; in fact, you are already buried in as deep a grave as you could wish. We shall only leave you there, that is all, ha! ha! What are your Spencer

carbines worth, and your soldiers with their fine uniforms and drill? It is only the old lesson we are teaching you: our forefathers taught it to Braddock, and it has been repeated many times since; but we shall drive it into you deeper than ever it has been before, ha! ha! You thought we had all gone, but our eyes were never off you; and now we are gathering our warriors from every hiding-place. This is the way we call them out—whoop! whoop! whoop! and they are lining the edge of the cañon before and behind you. You can take your time. It is only ten miles to the mouth; and the farther you go, the deeper the cañons get. Perhaps you wish to retreat? It is only eight miles back, and you know what sort of a path it is. From the cedars on the brink we will pick you off at our leisure, and you shall not see one of us. This country belongs to us—the whole of it; and we do not want your people here, nor your soldiers, nor your railroad. Get away to where you belong—if you can, ha! ha!"

It was not all this in detail, but the sum and concentration of it, that flashed through my mind as I listened to those yells, now rising clear and wild on the breeze, and now dying away in the distance.

We moved close up to the foot of the wall, from the top of which the shots came, thinking it would be too steep for them to hit us; but the great rocks that came rolling down upon us, resounding almost like heavy ordnance through the cañon, drove us away from that slight shelter. Here was a new danger, and a very serious one, since there was no hope that this kind of ammunition would give out, and the Indians evidently knew how to use it.

"Now, officers, be quick and sharp in giving your orders! Throw away precedent and drill, and come down to native common-sense!" "Now, soldiers, be prompt, and jump at the

word of command, and don't get disheartened! And you, muleteers; scatter out your animals, keep them sheltered as much as possible, and avoid all disorder. Now, everybody keep cool, for every man's life hangs upon a single movement here; and if a panic breaks out, all is lost, and the latest tragedy in the great Apache war, which they say has been waging against the Spaniards and Americans for over two hundred years, will have been enacted!" Soon the sharp, clear voice of the adjutant rang out from behind a huge rock in the channel, his carbine at a "ready," and without moving his eyes from the cliff—"Sergeant, send six men to scale that side of the cañon!"

As they moved out, General Gregg joined them and directed their movement.

I gave the next order to the little escort I had brought from New Mexico: "Sergeant Miller, station five men on this side of the cañon to cover that scaling party with their fire. Let them take shelter behind the rocks." This was done, and the devoted little band began slowly to ascend what seemed an almost vertical wall of sandstone.

Until now, although the yells had rung all around us, the firing was confined to the west side of the cañon, but at this moment a very close shot was fired from the other side, and our plans could not be carried out unless this was stopped. Another scaling party of six men was accordingly detailed, of which I took command, and began ascending the eastern cliff, covered by the fire of a second small party in the cañon. This disposed of all our fighting force, the remainder being required to take care of the animals. How we got up, God knows; I only remember hearing a volley from below, shots from above, Indian yells on all sides, the grating roar of tumbling boulders as they fell, and the confused echoing of

calls and shouts from the cañon. Exhausted, out of breath, and wet with perspiration, boots nearly torn off, and hands cut and bleeding, I sat down on the summit and looked around. Across the narrow chasm I saw the other scaling party. Everything was as quiet as death, the Indians had disappeared—melting away as suddenly and mysteriously as they had at first appeared. They had gone to their hidden lairs, cowed by our determined approach.

It had been hurriedly arranged before we ascended, that the scaling parties should move on down stream at the brink of the cañon, covering the pack-train and animals which would march along the bed. Accordingly we moved on towards the Rio Verde; but, in consequence of side cañons, were compelled to keep back at least half-a-mile nearer to the foot of the mountain than the course of the cañon.

Six miles farther, while skirting a ridge which projected from the mountain, the Indians from the top began yelling again like demons, and firing at us, but the range was too long to do any harm. They were too cowardly to attack even our small party, and now that we were no longer engulfed in a cañon, we laughed at their whoops. They followed us, however, hoping to catch us in a ravine, but we always sent three men across first to cover the rest and be covered by them in turn.

Just as the sun was setting we recognised from a high point the mouth of the Sycamore and the valley of the Rio Verde. We had not been able, from the roughness of the country, to approach the side of the cañon in which we supposed the rest of the party were moving, and could not, therefore, ascertain their whereabouts. But at last, towards dark, we descended a second time, by a deep side gorge, into the cañon, dropping down fully 2,000 feet in the space of

half an hour. It was just light enough when we reached the bed of the main cañon to discover that our party had not passed down it, and although fearful lest the Apaches should notice our descent and again pepper us in the narrow ravine, we turned up it to meet them.

That night's march up the cañon, over the broken rocks and through the tangled thickets, was worse, if anything, than the attack. Every pebble in the darkness was magnified to a boulder, and every boulder seemed as large as a house; fording the rapid stream twenty times, we shivered with cold and wet when we halted for a brief rest; expecting every moment to meet our party encamped, we yet wondered how they would dare to stop in such a place. Finally, near midnight, we halted under some sheltering rocks, and concluded to take some sleep; but the guides protested against having a fire, saying the Indians would detect and shoot into it. To sleep without one, however, was impossible. At last I concluded that it was better to die from an Indian arrow than to freeze to death in the darkness, and ordered a small one to be lighted, beside which we sat and slept and shivered until a little before day-light, when we took another smoke for breakfast and pushed out into the darkness to continue our march up the stream.

During the night a great rock had either become dislodged or had been rolled down by Indians, but it fell into the cañon with a report like thunder. I started up and found I had not dreamt it. I would give something to have a faithful picture of that little party, with the expression of each as they stood or leaned, staring out into the pitch-dark cañon and wondering what would come next.

By day-break we had got well on our way; when we heard shots in the rear, which we presumed to be Indians

firing into our abandoned camp. We commended ourselves for early rising and pushed on, wondering what could have become of General Gregg's party. Finally, the guides insisted on getting out of the cañon and striking towards Prescott, but I ordered them to keep a-head, feeling confident that we should soon meet the party or its trail.

At last all hope seemed to be gone, and I agreed to climb out up the western cliff. It was as much as we could do to reach the top, and imagine our feelings on arriving there to find that we were merely on a vertical ledge of rock, and that immediately on the other side was the same cañon we had come along an hour before. We scrambled along the narrow ledge, however, faint from hunger and fatigue, having come nearly twenty miles on foot, up and down cañons and steep ravines, climbing through mountain passes and stumbling over the rocky bed of the streams—equivalent to at least sixty miles, as we thought, on a level road. We had had nothing to eat for over twenty-four hours, and very little sleep; the night was bitterly cold, our over-coats were left behind when we scaled the cliff during the Indian attack, and we had nothing to comfort us but a "Tucson blanket" each, which scant covering can scarcely be interpreted in genteel society.

Such was our condition when one of the party cried out, "What is that smoke?" I got out my field-glass and saw two fires, and some animals grazing contentedly on a distant hill. "That is camp, boys! Orderly, fire two shots in quick succession!" The shots were fired. Anxiously we listened for the acknowledgment. It came soon—the two welcome answering shots, and we strode on with renewed heart.

Now if we had not seen camp, I could have walked as many miles as we had already gone without giving up, but when I came within two miles of camp, and felt certain of succour,

and could talk with General Gregg across a deep cañon, only half-a-mile distant, my legs, somehow or other, refused to carry me farther, and I came to the conclusion that infantry service was disagreeable on an empty stomach. So I made a fire and laid down to sleep, and sent for rations, which my faithful servant, George, brought out to me in the rain, with a flask of whiskey from General Gregg, and strict injunctions to be sure to drink it all—a command I promptly obeyed. I hope the Temperance Society will forgive me, as I could have drunk a demijohn under the circumstances without being affected by it.

It was by no means a short walk even from where we were to General Gregg's camp, as we had to head the deep side cañon, and to cross several others near their sources. It was raining, and the ground and rocks were slippery; but at last we arrived and received the gratulations of the party, who had heard the Indian shots and shouts, and feared we had met too many of the "noble reds."

General Gregg had found a way out of the Sycamore Cañon along a horrible trail, by unloading his pack mules and making several trips of it. He had signalled to us, but had no means of communication, and supposed we had struck for Camp Lincoln, a military post in the valley of the Verde fifty miles to the south.

My noble grey horse, Signor, is gone. He had helped to carry me faithfully from Santa Fé through New Mexico, and thus far into Arizona, but he has fallen a martyr to the topography of the sources of the Rio Verde. While George was leading him up a precipitous path he lost his footing in jumping over a rock, and tumbled to the bottom of the cañon, 100 feet, killing himself instantly. My other valuable horse, Don, whom I intend to take home if I get him safely

to the Pacific, had just scrambled over the same obstruction without stumbling. It was nothing less than a miracle that nobody was hurt. These Indians are poor shots, which, with the scarcity of guns among them, must account for our escape. They are afraid also of our "heap-firing guns" as they call the Spencers.

A little experience of this sort, occasionally, is not without use. It enables you to determine a number of nice problems which otherwise might never have been solved, to say nothing of the new phases in which it exhibits the character of your comrades; the test of their true-heartedness, their pluck, perseverance, and generosity. There are also some important minor questions to which it supplies accurate solutions. For instance, how would a man ever know whether a smooth boulder of lava or a flat sandstone slab would make the best pillow, until such occasions had induced him to test the matter practically at frequent intervals during the same night? And how could he ever ascertain the durability of a pair of Santa Fé boots under active service, until a trial of this kind had placed it forcibly before his observation? And while he might hitherto have had a theoretical appreciation of the value and excellence of a slice of fat pork with "hard tack" for dessert, it is doubtful whether he would ever comprehend the essential sweetness and delicacy of these dishes until, after twenty-four hours' fasting, he had watched with a field-glass across a cañon until they should start out towards him from a camp two miles distant.

We have given the question of evading the side of San Francisco Mountain with our railroad line a pretty thorough investigation, and are at last compelled to give it up. First, I tried to head the Sycamore and other northern branches of

the Verde, and to cross the country on a somewhat uniform level between 5,000 to 6,000 feet above tide, from the Colorado Chiquito to the Val de Chino. Second, to keep down the valley of the Verde itself; but the crooked cañons prevented this. Third, to keep along the foot-hills of Tonto Mountain overlooking the Verde from the south and west side. Fourth, to cross the Tonto Mountain and descend into the Verde at Copper Cañon, near Camp Lincoln, then to re-ascend east of the Mogollon Range and cross it to the Colorado Chiquito. But the valley of the Verde is an immense gulf, from 1,000 to 2,500 feet below the level of the mountains, or rather plateaux east and west on either side. Finally, within the last few days the profile of the line crossing the Mogollon Range, south of San Francisco Mountain, has pretty nearly satisfied me that there would not, after all, be much to gain by a southern route, especially if our line can descend to the Great Colorado in the vicinity of Fort Mojave, instead of by the Bill Williams Fort, of which I have hopes. My reconnoissance has settled some important questions of route, concerning which we should always have been in doubt, and Greenwood has continued his survey across the side of San Francisco Mountain without being delayed a day, using all three of his parties. The grades up to this place are easy, and the line runs for nearly 150 miles through a dense forest of fine tall pines, which will of themselves be a great advantage to the railroad in many ways.

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CHAPTER XII.

CENTRAL ARIZONA.

Hinchman lost for four days.—General Features of the Country west of the San Francisco Peaks.—Val de Chino.—Upper Valley of the Rio Verde.—Ruins everywhere.—Lower Valley of the Verde—Country around Prescott.—Valley of the Colorado.—Mineral Wealth.—Mogollon Ranges.—Mining Districts around Prescott.—Wickenburgh District.—La Paz District.—The Salt Mountains.—The Great Basin Region.—Difficulties of the Surveyors.—Tehachapa Pass.—Mining in California.—Yield of Precious Metals.

NOTWITHSTANDING the bonfires which were kept blazing all night above Signal Cañon, Hinchman did not return. Next morning they searched for him in all directions, but in vain. Fearing that he had fallen into the hands of the Apaches, they redoubled their exertions, and continued the search for three days, but still without success; and at last Palmer had to give it up and return to Prescott, persuaded that one of the greatest favourites of our whole party had fallen a victim to the cause. Hinchman, however, was intended by Providence for better things than to furnish a scalp and a night's amusement to the red-skins. He had lost his way, and, becoming confused in the intricacies of the cañon country, thought it best to make his way as well as he could to Prescott, where he arrived on the fourth day, thoroughly exhausted, not having tasted food during all that time.

After leaving the San Francisco Mountains to the eastward, the line by the 35th parallel enters a region not so well watered or timbered, but equally good for grazing purposes.

"The Val de Chino, which we now enter," says General

Palmer, "is a splendid meadow, ten miles in width, lying between the Aztec Range and Black Mountains on the south and west, and the Laja Range, Black Forest, and Tonto Buttes on the east and north. It extends south-eastward beyond the line of Prescott, and northward to within twenty miles of the Grand Cañon of the Colorado. This distance is considerably over 100 miles.

"Throughout it is covered with the finest grama grass, which gives the name to the valley. The soil is rich, and only needs water to enable the breadstuffs of an entire State to be raised here. Whipple thought irrigation might no more be necessary here than in the Zuñi valley; but it is impossible to try the experiment, as the Wallapi Indians infest the country.

"The average elevation of this great valley is about 4,500 feet above tide. Tributary to it are various small but rich mountain valleys, in some of which ranches have been started. Such are Pueblo and Walnut Creek, Turkey Creek, Partridge Creek, Round Valley, Williamson's Valley, Granite Creek, &c., most of which, in the rainy season and when the snows melt, pour down large volumes of water into the main valley. The Val de Chino is the proper head of the Rio Verde, along which, north and east of Prescott, lies much rich irrigable land in the open valleys between the numerous impassable cañons of this stream. The 'upper valley of the Verde,' which I visited, is about forty-five miles long, and an average of five miles in width. The soil is rich, water permanent (without alkali), and sufficient for all purposes of irrigation, the elevation being only 3,000 to 3,500 feet above tide. Snow is unknown; and the valley having a deep sandy soil, is richer than the valley of the Rio Grande; it is mixed, like the latter, with the detritus of lava deposits, and, being

admirably sheltered by mountain-walls on each side 1,200 to 2,400 feet high, is especially adapted to the production of wine and fruits. Wild grapes are everywhere abundant. The few settlers near Camp Verde informed me that they had raised seventy-five bushels of maize to the acre, without irrigation; also wheat and barley. All vegetables, except potatoes, flourish in the greatest abundance.

"In this valley, even to a greater extent than in the valley of the Colorado Chiquito, on the Mogollon Range, and in the Aztec Mountains, we met constantly the broken pottery, ruined foundations of pueblos, and abandoned caves, which indicate the former existence of that populous, semi-civilised race, which, for want of a better name, are called 'Aztecs.'

"Below the upper valley, but separated from it by a rugged and tortuous cañon, is the lower valley of the Verde, twenty-five miles long, and equally rich, and filled with Aztec ruins and pottery. These sheltered Verde valleys are, without doubt, well adapted for the production of cotton.

"There is much good arable country around Prescott also, and at the heads of the Agua Fria and other valleys leading southward to the Gila. Numerous ranches have been established here, and crops are raised without irrigation.

"We now descend gradually to the Rio Colorado, whose valley is wide and fertile. Whipple pronounced the soil superior to that of the Rio Grande valley. Of course the climate has much more of a tropical character, the elevation above the sea being less than 400 feet, snow being unknown, and the winter sometimes passing without any frost. Both climate and soil fit it for cotton, tobacco, hemp, castor beans, rice, and even sugar, to which products all the valley-land will, perhaps, be devoted, leaving the cereals to be brought down from the higher valleys of Arizona, or eastward from

the slopes of the Sierra Nevada and the Tulare and San Bernardino valleys of California. The Mormons raise a great deal of cotton at their settlements. On the Virgin and its tributaries, 150 miles north of Fort Mojave, they have several cotton factories in operation, and are building more. They also raise some sugar.

"At present the Mojaves, Chemenevis, and other populous tribes of Indians inhabiting the valley of the Colorado, raise corn, wheat, beans, melons, and squashes; and a large amount of hay is cut by them for Fort Mojave and the mining stock near Hardyville. Wheat ripens in April; barley harvest takes place in May. There is as yet no artificial irrigation, the valley being inundated annually by the river, which rises seventy-five feet in summer from the melting of the snows at its mountain sources. We found some stalks of fine Sea Island cotton growing here near Hardy's Mine, about 1,000 feet above the river, and melons were brought in by the Indians on Christmas week.

"From the head of navigation at Callville, for sixty miles down to Cottonwood Valley, there is no bottom-land. In this stretch occur Black Cañon and Painted Canon. In Cottonwood Valley, which is from one to five miles in width, there are about twenty square miles of arable land, which the Mormons talk of occupying for cotton plantations. Thence the river flows for twenty-five miles through Pyramid and other lesser cañons to a point three miles above Fort Mojave, where the bottom widens out on both sides of the river, in some places to ten miles, and so continues to where our line crosses it three miles above the 'Needles.' This is the Mojave valley; it is rich in soil, and contains about 100 square miles, of which over one-half is covered with cotton-wood and mezquit trees. Below our crossing occur the

Needles, where the projecting spurs of the Mojave Mountains, which wall in the Colorado on either side, impinge for probably six to eight miles directly on the river. Then comes the Chemenevis valley, about five miles wide, and very similar to the Mojave valley. Below the mouth of Bill Williams Fork there are occasional narrows, with wide and long stretches of bottom-land, sometimes, as at La Paz, thirty miles wide. This alteration continues to Fort Yuma.

"Whipple estimated the Colorado valley to contain, from Fort Mojave, south, 1,660 square miles of arable land, without including the southern desert—that part of the Great Basin lying south of the Morongo Range—which might be rendered fertile by means of irrigation."

Before considering the mineral productions of this section of the route, I will conclude the accounts of its physical characteristics with Dr. Parry's testimony:—"In point of fact, without taking into consideration the undeveloped mineral wealth locked up in her granite mountains, central Arizona comprises as large an extent of habitable and productive country as any other section west of the agricultural basin of the Mississippi."

The Mogollon ranges, which reach as far north as the Rio Gila, are found, by the united testimony of all explorers who have dared to traverse this section of the Apache country, to be very rich in gold and other minerals. It is here that Aubrey reported having met Indians with golden bullets. "They are," said he, "of different sizes, and each Indian has a pouch of them. We saw an Indian load his gun with one large and three small gold bullets to shoot a rabbit."

None of our surveyors were fortunate enough to be able to corroborate this report; but they obtained seven or eight

bullets of native manufacture which contained a larger percentage of silver than of lead.

From the San Francisco Mountains to the Aquarius Range, seventy-five miles east of the Colorado River, the proposed line passes to the north of the ascertained and developed mineral wealth, which is abundant in that extensive section of central Arizona, of which Prescott is the mining capital. This is, however, readily reached by a branch of easy grades, sixty miles in length, which can be cheaply built down the Val de Chino; and a fork can be extended thence to the Wickenburgh mining region.

In this district the most promising mine is the Vulture, which yields about 25,000 dollars a month, and in which seventy-five men (mostly Mexicans) are employed.

The following statement will show at a glance how hard it is for even a first-class mine to pay largely in these regions whilst they remain shut out as they are from the rest of the world.

VULTURE MINE AND MILL.—MONTHLY EXPENSES.

	Dollars.
Pay roll	9,000
Incidentals	3,520
Hauling ore, 864 tons, at 10 dollars	8,640
Fuel	720
Interest on capital invested	875
Total monthly expenses	22,755

MONTHLY RETURNS.

864 tons, yielding 30 dollars per ton	25,920
Net monthly profit	3,165

On both sides of the Colorado River north and south of Fort Mojave are mines of gold, silver, and copper, the value of which is greatly enhanced by their proximity to this stream, which will thus serve as a most valuable feeder to the

railroad. Of these the best known are the copper mines of the Bill Williams, of which Mr. Ross Brown says—"There are fifty good mines of rich copper, black and red oxides, silicates, and carbonates, all of such a character that they can be readily smelted by heat alone. The ores average forty per cent. of metal. Many of these ores are also rich in gold, for which mills have been erected."

These mines were visited by Dr. Parry in December, who reports that they were shipping all ores of forty per cent. and over to San Francisco by an uncertain and circuitous water-channel nearly 2,500 miles long, and that the main bulk was thence transported, by way of Cape Horn, to Swansea, in Wales, for reduction. Even then they paid their possessors.

Dr. Parry also visited the mining regions in western Arizona, south of Bill Williams Mountain, of which he reports:—"At several points gold has been successfully worked, yielding, in a few instances, rich returns from the rudest processes of dry washing. Quartz veins crop out in wonderful abundance in several isolated localities; especially noted ten to fifteen miles west of La Paz, where rich deposits of silver and copper ores are also known to exist, and have been partially worked; but, in nearly every instance, mining enterprise has been forced to succumb to insurmountable difficulties, and in not a few cases to actual loss of life."

From ten to forty miles north of Callville, which is 100 miles above Fort Mojave, both being on the Colorado, are the famous Salt Mountains, where there is an inexhaustible quantity of pure rock salt very accessible to miners. At one point there is a surface exposure of seventy feet, clear as a crystal. For several miles square the formation is reported to be almost exclusively of this crystalline salt. There is a little sloop, of twenty-five tons, running from Fort Mojave to

Callville, which takes up merchandise and brings back salt, potatoes, and other produce. Aubrey reports having found rich gold placers between Fort Mojave and Callville, near the mouth of Yampa Creek.

* * * * * *

California, to the Western traveller, means civilisation; the very name implies "square meals" (*déjeúner à la fourchette?*), arm-chairs, boot-blacking, and other luxuries; but the man who enters it by crossing the Colorado at the Needles would certainly not recognise the Golden State. Two hundred and thirty-five miles of complete desert have to be passed through before he reaches the base of the Sierra Nevada. The line surveyed by our parties, after leaving the river at an elevation of only 428 feet, ascends again 2,151 feet to Piute Summit, where it enters the Great Basin and then gradually descends into a natural depression only 675 feet above the sea. From this basin—called "Perry Sink," after our botanist—it passes into the Mojave Basin, and at last reaches the foot of Tehachapa Pass, where the fertile slopes of the sierra are soon reached. Here the surveyors met agricultural settlements for the first time for many weeks, and found the mountain glades well furnished with fine timber. Their camp in one of the oak groves, which are so abundant here, forms the subject of the accompanying engraving.

The rains, which were so incessant during the month of January at San Francisco, extended with diminished force over this southern desert also, and greatly impeded the progress of the parties; when, however, they had crossed the mountains and tried to march through the central trough of California—the Tulare valley—they found themselves almost brought to a standstill. General Palmer here left them, and in company with Colonel Willis, Dr. Parry, and Captain

Vincent Brooks, Day & Son, lith

TEHACHAPA PASS IN THE SIERRA NEVADA.

Colton, who had joined him from San Diego, found his way, as best he could, by horse, wagon, stage and rail, to San Francisco.

It is useless to praise the agricultural resources of California, for they are well known, or to speculate upon the most probable route for the railway through its midst; for it

The Teams at Eventide, California.

matters little whether it runs to the east or west of the Great Tulare Lake, whether it continues all the way in the San Joaquin valley, or crosses the coast range into the fertile plains of the Salinas. Whatever be its course it will develop vast areas of land unsurpassed in productiveness by any on the globe.

As regards mineral wealth, the southern half of the Great

Basin is quite as rich in silver as the northern; and although "unexplored" covers this barren tract in our atlases, it is in reality divided into countries and mining districts, which latter are fast multiplying every year.

Most of the gold mining in California is carried on along the western foot of the Sierra Nevada, and although it does not yield the same amount as formerly, it has developed into a steady thriving industry, with no more excitement about it than any other regular occupation.

The ingenuity displayed by the Californian miners in trying to obtain the gold from the soil is extraordinary. The first arrivals used only the pan, a flat iron saucer about eighteen inches in diameter, for extracting the gold. Soon the rocker was introduced. It is shaped like a cradle with a riddle above at one end, upon which the pay dirt is placed, and transverse grooves along the bottom to catch the gold, while the miner rocks the cradle with one hand, and washes the pay dirt through the riddle with the other. For the first four years, although the pan and the rocker were alone relied upon, most of the rich, well-watered placers were soon exhausted, and it was necessary that some means should be devised for directing water to less-favoured districts. This led to the introduction of mining ditches to carry water from the highest springs in the hills to the auriferous ground at their base. Such ditches were expensive, for the water had to be brought in "flumes" for miles across ravines 200 or 300 feet deep, along the rugged mountain-sides, and often through rock cuttings; and the capital required to make these aqueducts had usually to be borrowed at the rate of from 3 to 10 per cent. per month.

With the mining ditches came the "tom" and sluice. The tom is a trough twenty feet long and eight feet deep; it is fifteen inches wide at the head and thirty at the foot. This

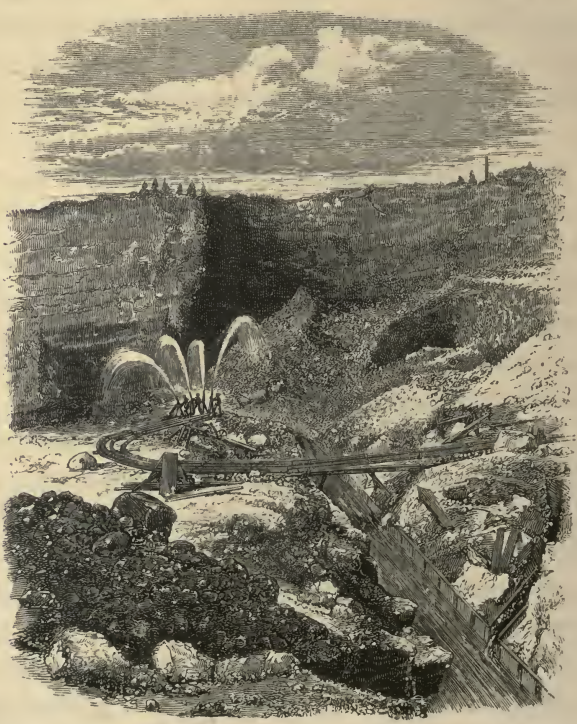
trough rests upon a flat box; its bottom is formed of sheet-iron pierced with holes, through which the pay dirt is washed by a constant stream of water. The gold is caught by transverse "cleets," or "riffles," which rise from the bottom of the box, and all the pay dirt which passes over the tom undecomposed is again thrown back, to go through the same process again. The sluice is the box of the tom in principle, elongated to any length from 100 to 1,000 feet; it has transverse cleets along its whole length, to catch the gold, and is placed at an inclination of one in twenty, so as to cause the water to rush through it like a torrent. This was a great invention, for twenty miners could work at one sluice together, and, with plenty of water, they had nothing to do but to throw in the pay dirt and take out the gold. If many sluices discharged into one stream or ditch, a tail sluice was often dug in the ground to catch the gold which had escaped from the sluices, and this tail sluice often paid largely, with no labour save that required to "clear up" occasionally, that is, to wash out the metal from the sand at the bottom.

By the end of the year 1852 the surface placers were nearly exhausted, good sluice claims were at a high premium, and there was not work enough for one-third of the miners. Large amounts of capital were required for the ditch companies, and almost as much for the sluices.

In this predicament, the attention of the American miners was suddenly directed to quartz mining. The Mexicans had worked quartz veins for a long time by pounding the ore in mortars, or grinding it in their rude arastra, and extracting the fine gold-dust by means of quicksilver. The Americans immediately introduced stamp mills, and their ideas were so large that the most bulky and elaborate machinery was soon in operation; companies with large capital were rapidly

formed; many hands were employed; quartz was crushed in enormous quantities in a great number of places, whether it was rich or poor, and complete failure was consequently the result in the great majority of cases. A stamp mill has already been explained and figured in Chap. xii., Part I.

The first attempt at quartz mining having proved unsuccess-



Hydraulic Mining.

ful, the miners tried to invent a process by which the gold could be cheaply extracted from large quantities of land which contained only a small percentage. This led to the hydraulic process. With "poor dirt" to work up, the shovel did not furnish earth enough for the sluice, and the wages of twelve out of twenty men must, if possible, be

saved. As early as 1852, a man named Mattison, of Connecticut, invented an hydraulic machine, by means of which a stream of water could be directed, under heavy pressure, against a bank or hill-side, containing placer gold, and the earth torn down by the action of the jet of water and carried into the sluice to be washed, thus saving the expense of shovelling.

It was long before this process made much way in California; but at present it is in general use, and pays largely. Its advantages are enormous. A man with a rocker, for instance, can wash out one cubic yard of earth in a day; with a tom, two; with a sluice, four; and, with an hydraulic squirt and sluice together, fifty, or even a hundred. A stream of water rushing through a two-inch pipe, under pressure of 200 feet perpendicular, has tremendous force, and the hill-sides crumble away before it as if they were made of sawdust.

In the engraving, the water-pipes, the hydraulic squirt, and the sluice are clearly shown. The two former are usually owned by a water-company, which supplies the water to the miners at so much a thousand cubic feet. Hundreds of miles of iron pipes now ramify through the mountains in every direction; and even their transportation to these remote regions represents an enormous amount of capital.

This powerful agent has changed the whole face of nature in a hundred districts along the base of the mountains. I have seen valleys obliterated, hills levelled to the ground, rivers turned from their course and fertile tracts of country covered with bare heaps of gravel miles in extent. It is an extraordinary sight to pass through a region which has for some time been subjected to the hydraulic process. A Californian might well return from a year's travel in Europe, and find, like Rip Van Winkle, that everything had so changed in his absence that not a hill remained standing where he had left it.

Notwithstanding all the varied and ingenious appliances which the Americans have introduced, the yearly production of gold in California has steadily been on the decrease, whilst the exportation of precious metal has, owing to the productiveness of other territories, been as steadily advancing.

Since 1848, the Western States and Territories have produced no less than £250,000,000 sterling of precious metals, and they continue to yield yearly about £15,000,000 more. Mexico produced in the three hundred years previous to 1845 about £540,000,000. Since then the annual yield has probably not exceeded £5,000,000; so that, although the total yield up to 1867 would be about £600,000,000, the United States will probably exceed that sum before the end of the present century.

Whilst General Palmer, Dr. Parry, and Major Calhoun were examining the natural productions of the country, and the surveyors were hard at work trying to find a level route across the regions which lie about 100 miles south of the Great Cañon of the Colorado, an unfortunate prospector was actually floating through that stupendous chasm on a simple raft of cotton-wood. Dr. Parry had the good fortune to meet this man, after his perilous trip, at Hardyville, on the Rio Colorado, and to hear from his own lips the story of his adventure. The doctor carefully noted all the particulars of the story, and closely cross-questioned the hero of it, who, although a simple and illiterate man, was brave, straightforward, and one to be thoroughly believed. Major Calhoun, who had appointed to meet him at Fort Mojave, but was prevented from doing so, has kindly compiled for me the following account from the notes taken by Dr. Parry, and is thus the writer of one of the most tragic pages to be met with in the histories of actual adventure.

CHAPTER XIII.

PASSAGE OF THE GREAT CAÑON OF THE COLORADO BY JAMES WHITE, THE PROSPECTOR.

TWENTY years ago the trapper and hunter were the romantic characters of the Far West. They still figure in fiction, and there is a fascination about their daring deeds which, in America, makes Boone a household name, and throws an air of chivalry, seldom to be felt now-a-day, around the exploits of such men as Carson, Crockett, and Williams. Nor is our admiration for these hardy men undeserved; they have trapped on every Western stream, and hunted on every mountain-side, despite the opposition of the Indian and the barrier of winter snows. They have been the skirmish line of that great army of occupation which is daily pushing westward, and they have taught the savage to respect the white man's courage and to fear the white man's power.

While the field for the trapper and hunter has been gradually growing less, another class of adventurers has come into existence—the "prospectors" in search of precious metals. Within the last nineteen years these men have traversed every mountain slope, from the rugged peaks of British Columbia to the rich plateaux of old Mexico; and have searched the sands of every stream from the Mississippi to the shores of the Pacific, stimulated by the same hope of

reward that led the early Spaniards to explore places, still unsettled, in their search for an "El Dorado." Could the varied and adventurous experience of these searchers for gold be written we should have a record of daring and peril that no fiction could approach, and the very sight of gold would suggest to our minds some scene of startling tragedy, some story of hair-breadth escape. Could we but gather and set down in proper form the geographical knowledge possessed by these men, we should know as much of the western wilds as we now do of the long-settled portions of the American continent.

It has fallen to the lot of one of these prospectors to be the hero of an adventure more thrilling than any heretofore recorded, while, at the same time, he has solved a geographical problem which has long attracted the attention of the learned at home and abroad, who could but theorise before his voyage as to the stupendous chasms or cañons through which the Colorado cleaves its course.

James White, our hero, now lives at Callville, Arizona Territory, the present head of navigation on the Colorado River. His home is in Kenosha, Wisconsin. He is thirty-two years of age, and in person is a good type of the Saxon; being of medium height and heavy build, with light hair and blue eyes. He is a man of average intelligence, simple and unassuming in his manner and address, and without any of the swagger or bravado peculiar to the majority of frontier men. Like thousands of our own young men, well enough off at home, he grew weary of the slow but certain method of earning his bread by regular employment at a stated salary. He had heard of men leaping into wealth at a single bound in the Western gold-fields, and for years he yearned to go to the land where fortune was so lavish of her favours.

He readily consented then to be one of a party from his neighbourhood who, in the spring of 1867, started for the plains and the gold-fields beyond. When they left Fort Dodger, on the Arkansas River, April 13th, 1867, the party consisted of four men, of whom Captain Baker, an old miner and ex-officer in the Confederate army, was the acknowledged leader. The destination of this little party was the San Juan valley west of the Rocky Mountains, about the gold-fields of which prospectors spoke in the most extravagant terms, stating that they were only deterred from working the rich placers of the San Juan by fear of the Indians. Baker and his companions reached Colorado "city," at the foot of Pike's Peak, lat. 38°, in safety. This place was, and is still, the depôt for supplying the miners who work the diggings scattered through South Park, and is the more important for being situated at the entrance of Ute Pass, through which there is a wagon-road crossing the Rocky Mountains, and descending to the plateau beyond. The people of Colorado "city" tried to dissuade Baker from what they considered a rash project, but he was determined to carry out the original plan. These representations, however, affected one of the men so much that he left the party, and the others, Captain Baker, James White, and Henry Strole, completed their outfit for their prospecting tour.

The journey was undertaken on foot, with two pack mules to carry the provisions, mining tools, and the blankets they considered necessary for the expedition. On the 25th of May they left Colorado "city," and crossing the Rocky Mountains, through the Ute Pass, they entered South Park, being still on the Atlantic slope of the continent. Ninety miles brought them across the Park to the Upper Arkansas, near the Twin Lakes. They then crossed the Snowy Range, or Sierra

Madre, and descended towards the Pacific. Turning south-west, they passed around the head-waters of the Rio Grande del Norte, and after a journey of 400 miles, they reached in safety the Animas, the most northern branch of the San Juan River, which flows into the Great Colorado from the east.

They were now in the land where their hopes centred, and to reach which they had crossed plains and mountains, and forded rapid streams, leaving the nearest abodes of the white man hundreds of miles to the east. Their prospecting for gold began in the bed of the Animas, and though they were partially successful, the result did not by any means reach their expectations; so they followed down the stream into the main valley of the San Juan. There was gold there, but not in the quantity they expected; so they gradually moved west, along the beautiful valley, for 200 miles, when they found that the San Juan entered a deep and gloomy cañon. To avoid this they forded the river to the right bank, and struck across a rough timbered country, directing their course towards the Great Colorado.

Having travelled through this rough country for a distance estimated at fifty miles, they reached Grand River, being still above the junction of Green River, the united waters of which two streams form the Colorado proper. At the point where they struck the river it was hemmed in by cliffs of perpendicular rock, down which they could gaze at the coveted water, dashing and foaming two thousand feet below. Men and animals were suffering for water, so they pushed up the stream along the rocky uneven cañon wall, hoping to find a place where they could descend to the river. After a day spent in clambering over and around the huge rocks that blocked their way, they came upon a side cañon, which they succeeded in descending with their animals, and where

they obtained the water of which all stood so much in need.

On the night of the 23rd of August they encamped at the bottom of the cañon, where they found plenty of fuel, and grass in abundance for their animals. As they sat around the camp fire they lamented their failure in the San Juan country, and Strole began to regret that they had undertaken the expedition. But Baker, who was a brave, sanguine fellow, spoke of *placeres* up the river about which he had heard, and promised his companions that all their hopes should be realised, and that they should return to their homes to enjoy the gains and laugh at the trials of their trip. So glowingly did he picture the future, that his companions even speculated as to how they should spend their princely fortunes when they returned to the States. Baker sang songs of home and hope, and the others lent their voices to the chorus till, far into the night, they sank to sleep unguarded, to dream of coming opulence, and to rise refreshed for the morrow's journey.

Early next morning they breakfasted, and began the ascent of the side cañon up the opposite bank to that by which they had entered it. Baker was in the advance with his rifle slung at his back, gaily springing up the rocks towards the table-land above. Behind him came White; Strole, with the mules, brought up the rear. Nothing disturbed the stillness of the beautiful summer morning but the tramping of the mules and the short heavy breathing of the climbers. They had ascended but half the distance to the top, when stopping for a moment to rest, suddenly the war-whoop of a band of savages rang out, sounding as if every rock had a demon's voice. Simultaneously with the first whoop a shower of arrows and bullets was poured into the little party. With

the first fire Baker fell against a rock, but, rallying for a moment, he unslung his carbine and fired at the Indians, who now began to show themselves in large numbers, and then, with the blood flowing from his mouth, he fell to the ground. White, firing at the Indians as he advanced and followed by Strole, hurried to the aid of his wounded leader. Baker, with an effort, turned to his comrades and said with his last breath, "Back, boys, back! save yourselves; I am dying." To the credit of White and Strole be it said, they faced the savages and fought till the last tremor of the powerful frame told them that Baker was dead.

Then slowly they began to retreat, followed by the exultant Indians, who, stopping to strip and mutilate the dead body in their path, gave the white men a chance to secure their animals, and retrace their steps into the side cañon, beyond the immediate reach of the Indians' arrows. Here they held a hurried consultation. To the east, for 300 miles, stretched an uninhabited country, over which, if they attempted to escape in that direction, the Indians, like bloodhounds, would follow their track. North, south, and west, was the Colorado with its tributaries, all flowing through deep chasms across which it would be impossible for men or animals to travel. Their deliberations were necessarily short, and resulted in a decision to abandon the animals—first securing their arms, a small stock of provisions, and the ropes or lariots of the mules. Through the descending side cañon they travelled due west for four hours, and emerged at last on a low strip of bottom-land on Grand River, above which, for 2,000 feet on either bank, the cold grey walls rose to block their path, leaving to them but one avenue for escape—the dashing current of the river.

They found considerable quantities of drift-wood along the

banks, from which they collected enough to enable them to construct a raft capable of floating themselves, with their arms and provisions. This raft consisted of three sticks of cotton-wood, about ten feet in length and eight inches in diameter, lashed firmly together with their lariots. Procuring two stout poles with which to guide the raft, and fastening the bag of provisions to the logs, they waited for midnight to come with the waning moon, so as to drift off unnoticed by the Indians. They did not consider that even the sun looked down into that chasm for but one short hour in the twenty-four, and then left it to the angry waters and blackening shadows; and that the faint moonlight reaching the bottom of the cañon would hardly serve to reveal the horror of their situation. Midnight came, as they thought, by the measurement of the dark, dreary hours; when, seizing the poles, they untied the rope that held the raft, and, tossed about by the current, they rushed through the yawning cañon on their adventurous voyage to an unknown landing. Through the long night they clung to the raft as it dashed against half-concealed rocks, or whirled about like a plaything in some eddy, whose white foam was perceptible even in the blackness.

They prayed for the daylight, which came at last, and with it a smoother current and less rugged banks, though the cañon walls appeared to have increased in height. Early in the morning (August 25th) they found a spot where they could make a landing, and went ashore. After eating a little of their water-soaked provisions, they returned and strengthened their raft by the addition of some light pieces of cedar, which had been lodged in clefts of the rocks by recent floods. White estimates the width of the river where they landed at 200 yards, and the current at three miles per hour. After a short stay at this place they again embarked, and during the rest of

the day they had no difficulty in avoiding the rocks and whirlpools that met them at every bend of the river.

In the afternoon, and after having floated over a distance estimated at thirty miles from the point of starting, they reached the mouth of Green River, or rather where the Green and the Grand unite to form the Colorado proper. Here the cañons of both streams form one of but little greater width, but far surpassing either in the height and grandeur of its walls. At the junction, the walls were estimated at 4,000 feet in height. Detached pinnacles appeared to rise, one above the other, for 1,000 feet higher, from amidst huge masses of rock, confusedly piled, like grand monuments to commemorate this "meeting of the waters." The fugitives felt the sublimity of the scene, and in contemplating its stupendous and unearthly grandeur, they forgot for the time their own sorrows.

The night of the day upon which they entered the Great Cañon, and indeed on nearly all the subsequent nights of the voyage, the raft was fastened to a loose rock, or hauled up on some strip of bottom-land, where they rested till daylight next morning.

As they floated down the cañon the grey sandstone walls increased in height; the lower portion was smooth from the action of floods, but the perpendicular wall-rock above became more and more rugged, until the far-off sky appeared to rest upon a fringe of pinnacles on either side. Here and there a stunted cedar clung to the cliff-side 2,000 feet overhead, or a prickly cactus tried to suck sustenance from the bare rock. No living thing in sight beyond the raft, for even the wing of bird which could pass the chasms in the upper world never fanned the dark air in those subterranean depths. Nought to gaze on but their own pale faces and the cold grey walls

that hemmed them in, and mocked at their escape. Here and there the raft shot past side cañons, black and forbidding, like cells set in the walls of a mighty prison.

Baker had informed his comrades as to the geography of the country, and while floating down they remembered that Callville was at the mouth of the cañon, which could not be far off; "such wonderful walls could not last." Then hope came with the promise of escape. A few days would take them to Callville; their provisions could be made to last for five. So these two men, thus shut *in* from the world, buried, as it were, in the very bowels of the earth, in the midst of a great unknown desert, began to console themselves, and even to jest at their situation.

Forty miles below their entrance into the cañon of the Colorado, they reached the mouth of the San Juan River. They attempted to enter it, but its swift current cast them back. The perpendicular walls, high as those of the Colorado, with the water flowing from bank to bank, forbade their abandoning their raft to attempt escape in that direction. So they floated away. At every bend of the river it seemed as if they were descending deeper into the earth, and that the walls were coming closer together above them, shutting out the narrow belt of sky, thickening the black shadows, and redoubling the echoes that went up from the foaming waters.

Four days had elapsed since they embarked on the frail raft; it was now August 28th. So far they had been constantly wet, but the water was comparatively warm, and the current more regular than they could have expected. Strole had taken upon himself to steer the raft, and, against the advice of White, he often set one end of the pole against the bank or some opposing rock, and then leaned with the other end against his shoulder, to push the raft away. As

yet they had seen no natural bridge spanning the chasm above them, nor had fall or cataract prevented their safe advance. About three o'clock on the afternoon of the 28th, they heard the deep roar as of a waterfall in front of them. They felt the raft agitated, then whirled along with frightful rapidity towards a wall that seemed to bar all farther progress. As they approached the cliff, the river made a sharp bend, around which the raft swept, disclosing to them, in a long vista, the water lashed into foam, as it poured through a narrow precipitous gorge, caused by huge masses of rock detached from the main wall. There was no time to think. The logs strained as if they would break their fastenings. The waves dashed around the men, and the raft was buried in the seething waters. White clung to the logs with the grip of death. His comrade stood up for an instant with the pole in his hands, as if to guide the raft from the rocks against which it was plunging; but he had scarcely straightened, before the raft seemed to leap down a chasm, and, amid the deafening roar of waters, White heard a shriek that thrilled him to the heart, and looking round he saw, through the mist and spray, the form of his comrade tossed for an instant on the water, then sinking out of sight in the whirlpool.

White still clung to the logs, and it was only when the raft seemed to be floating smoothly, and the sound of the rapids was left behind, that he dared to look up; then it was to find himself alone, the provisions lost, and the lengthening shadows warning him of the approaching night. A feeling of despair seized him, and clasping his hands he prayed for the death he was fleeing from. He was made cognizant of more immediate danger by the shaking of his raft, the logs were separating; then he worked, and succeeded in effecting a landing near some flat rocks, where he made his raft fast

Vincent Brooks Day & Son Lith

THE GREAT CAÑON OF THE COLORADO.

for the night. After this he sat down, to spend the long gloomy hours in contemplating the horror of his situation, and the small chance for completing the adventurous voyage he had undertaken. He blamed himself for not having fought the Indians till he had fallen with Baker. He might have escaped through the San Juan valley and the mountains beyond to the settlements. Had he done so, he would have returned to his home, and rested satisfied with his experience as a prospector. And when he thought of "home," it called up the strongest inducements for life, and he resolved, to use his own words, "to die hard, and like a man."

Gradually the dawn, long perceptible in the upper world, began to creep down the black cañon, and gave him light to strengthen his raft, and launch it again into the treacherous river. As he floated down he remembered the sad fate of Strole, and took the precaution to lash himself firmly to the raft, so as to preclude the possibility of his being separated from it. This forethought subsequently saved his life. His course through the cañon was now over a succession of rapids, blocked up by masses of rock, over which his frail raft thumped and whirled, at times wholly submerged in the foaming water. At one of these rapids, in the distance of about a hundred yards, he thinks the river must have fallen between thirty and forty feet. In going over this place the logs composing the raft became separated at the upper end, and, spreading out like a fan, White was thrown into the water. He struggled to the side by means of his rope, and with a desperate strength held the logs together till they floated into calmer water, when he succeeded in refastening them.

White's trials were not yet at an end, and in relating the following incident he showed the only sign of emotion exhibited during his long series of answers.

About four miles below where the raft separated he reached the mouth of a large stream, which he afterwards learned was the Colorado Chiquito. The cañon through which it enters the main river is very much like that of the San Juan, and though it does not discharge so large a body of water, the current is much more rapid, and sweeps across the Great Colorado, causing, in a black chasm on the opposite bank, a large and dangerous whirlpool. White saw this and tried to avoid it, but he was too weak for the task. His raft, borne by the current of the Colorado proper, rushed down with such force, that aided by his paddle he hoped to pass the waters that appeared to sweep at right angles across his course from the Chiquito. When he reached the mouth of the latter stream the raft suddenly stopped, and swinging round for an instant as if balanced on a point, it yielded to the current of the Chiquito and was swept into the whirlpool.

White felt now that all further exertion was useless, and dropping his paddle, he clasped his hands and fell upon the raft. He heard the gurgling waters around him, and every moment he felt that he must be plunged into the boiling vortex. He waited with his eyes closed for some minutes, when, feeling a strange swinging sensation, he opened them and found that he was circling round the whirlpool, sometimes close to the vortex, and at others thrown back by some invisible cause to the outer edge only to whirl again towards the centre. Thus borne by the circling waters he looked up, up, up, through the mighty chasm that seemed bending over him as if about to fall and crush him. He saw in the blue belt of sky which hung above him like an ethereal river the red tinged clouds floating, and knew that the sun was setting in the upper world. Still around the whirlpool the raft swung, like a circular pendulum measuring the long

moments before expected death. He felt a dizzy sensation, and thinks he must have fainted; he knows he was unconscious for a time, for when again he looked up between the walls, whose rugged summits towered 5,000 feet above him, the red clouds had changed to black, and the heavy shadows of night had crept down the cañon.

Then, for the first time, he remembered that there was a strength greater than that of man, a power that holds the ocean in the hollow of His hand. "I fell on my knees," he said, "and as the raft swept round in the current, I asked God to aid me. I spoke as if from my very soul, and said, 'Oh, God! if there is a way out of this fearful place show it to me; take me to it.'" Here White's voice became husky, and his somewhat heavy features quivered as he continued—"I was still looking up with my hands clasped when I felt a different movement in the raft, and turning to look at the whirlpool, it was some distance behind, and I was floating down the smoothest current I had yet seen in the cañon."

This statement is the only information White volunteered; all the rest was obtained by close questioning. One of his friends who was present during the examination smiled when White repeated his prayer. He noticed it, and said with some feeling: "It is true, Bob, and I'm sure God took me out."

Below the mouth of the Colorado Chiquito the current was very slow, and White felt what he subsequently found to be the case—viz., that the rapids were past, though he was not equally fortunate in guessing his proximity to Callville. The course of the river below this he describes as exceedingly "crooked, with short, sharp turns," the view on every side being shut in by flat precipitous walls of "white sand-rock." These walls presented white perpendicular surfaces to the

high water-level, which had a distinct mark of about forty feet above the August stage. The highest part of the cañon, White thinks, is between the San Juan and the Colorado Chiquito, where the wall appeared to him more than one mile (5,280 feet) in perpendicular height, and at a few points even higher. Dr. Newberry states, from barometrical observations, that for a long distance the altitude is nearly 7,000 feet. But we must not begin to draw conclusions too soon, much of interest remains to be told of this unparalleled adventure.

The current bore White from the Colorado Chiquito slowly down the main river. His clothing was torn to shreds, and the few rags which clung to his frame were constantly saturated with water. Each noon the sun looked into the cañon only to pour his almost vertical rays on the famishing man, and to burn and blister those parts of his body that the scanty rags did not cover. One, two, three, four days dragged slowly past since he tasted food, and still the current bore him through the towering walls of the cañon. The hunger maddened him. He felt it burning into his vitals. His thoughts were of food! food! food! and his sleeping moments were filled with Tantalus-like dreams. Once he raised his arm to open some vein and draw nutriment from his own blood, but its shrivelled, blistered length frightened him. For hours as he floated down he would sit looking into the water, yet lacking courage to make the plunge that would rid him of all earthly pain. On the morning of the fifth day since he had tasted food, he saw a flat bank with some mezquit bushes upon it, and by using all his strength he succeeded in reaching it with his raft. He devoured the few green pods and the leaves of the bushes, but they only increased his desire for more. The journey was resumed, and he remembers that during the last two days of unbroken

cañon wall, the rocks became very black, with shining surfaces—probably where the igneous took the place of the cretaceous rocks.

Six days without food, save the few green leaves, and eleven days since starting, and still the uneven current bore on the raft with its wretched occupant. He saw occasional breaks in the wall, with here and there a bush. Too weak to move his raft, he floated past and felt no pain, for the overwrought nerves refused to convey sensation.

On the afternoon of this, the sixth day, he was roused by hearing the sound of human voices, and, raising himself on one arm, he looked towards the shore, and saw men beckoning to him. A momentary strength came to his arms, and, grasping the paddle, he urged the raft to the bank. On reaching it he found himself surrounded by a band of Yampais Indians, who for many years have lived on a low strip of alluvial land along the bottom of the cañon, the trail to which, from the upper world, is only known to themselves. One of the Indians made fast the raft, while another seized White roughly and dragged him up the bank. He could not remonstrate; his tongue refused to give a sound, so he pointed to his mouth and made signs for food. The fiend that pulled him up the bank, tore from his blistered shoulders the shreds that had once been a shirt, and was proceeding to take off the torn trousers, when, to the credit of the savage be it said, one of the Indians interfered, and pushed back his companions. He gave White some meat, and roasted mezquit beans to eat, which the famished man devoured, and after a little rest he made signs that he wanted to go to the nearest dwellings of the white men. The Indians told him he could reach them in "two suns" by his raft, so he stayed with them all night, and with a revolver that remained

fastened to the logs, he purchased some mezquit beans, and the half of a dog.

Early the next morning he tottered to the bank, and again pushed into the current. The first day out he gave way to the yearnings for food, and, despite his resolution to the contrary, he ate up his entire stock of provisions, which did not, by any means, satisfy his craving. Three long days of hope and dread passed slowly by, and still no signs of friends. Reason tottered, and White stretched himself on the raft; all his energies exhausted, life and death were to him alike indifferent.

Late in the evening of the third day after leaving the Indians, and fourteen days from the time of starting on this perilous voyage, White again heard voices, accompanied by the rapid dash of oars. He understood the words, but could make no reply. He felt a strong arm thrown around him, and he was lifted into a boat, to see manly bearded faces looking on him with pity. The great objective point, Callville, was reached at last; the battle for a life was won, but with the price of unparalleled suffering. The people of this Mormon settlement had warm, generous hearts, and, like good Samaritans, lavishly bestowed every care on the unfortunate man, so miraculously thrown into their midst from the bowels of the unknown cañon. His constitution, naturally strong, soon recovered its terrible shock, and he told his new-found friends his wonderful story, the first recital of which led them to doubt his sanity.

Charles McAllister, at present an assistant in the store of Mr. Todd at Fort Mojave, was one of the three men who went in the boat to White's assistance. He said that he never saw so wretched a looking man as White when he first met him; his feet, legs, and body were literally flayed, from ex-

posure to drenching from water and the scorching rays of the sun. His reason was almost gone, his form stooped, and his eyes were so hollow and dreary, that he looked like an old and imbecile man. Mr. W. H. Hardy, of Hardyville, near Fort Mojave, brought White thither, that we might see and talk with him. Mr. Hardy corroborates the statements of McAllister, and from his knowledge of the country above Callville, says that it would be impossible for White to have come for any distance by the river, without travelling through the whole length of the Great Cañon of the Colorado. Mr. Ballard, a mail contractor, in whose employment White is now earning money to take him home, says he believes him to be a sober, truthful man; but, apart from White's statement, Ballard is confident he must have traversed, and in the manner stated, that hitherto unexplored chasm which completes the missing link between the upper and lower course of the Great Colorado.

Dr. Parry, our geologist, thinks that the subjoined conclusions may be summed up as some of the new additions to our previous geographical knowledge of the hydrography of the Great Colorado of the West, derived from this remarkable voyage.

1. The actual location of the mouth of the San Juan forty miles below Green River junction, and its entrance by a cañon continuous with that of the Colorado, above and below the point of junction.

2. From the mouth of the San Juan to the Colorado Chiquito, three days' travel in the swiftest portion of the current allowing four miles per hour for fifteen hours or sixty miles per day, would give an estimated distance of 180 miles, including the most inaccessible portion of the cañon.

3. From the Colorado Chiquito to Callville occupied ten

days' travel. As this part of the route was more open, and probably comprised long stretches of comparatively still water, it would not be safe to allow a distance of over thirty miles per day, or 300 miles for this interval. Thus the whole distance travelled would be 550 miles, or something over 500 miles from Green River junction to the head of steamboat navigation at Callville.

4. The absence of any distinct cataracts, or perpendicular falls, would seem to warrant the conclusion that in time of high water, by proper appliances, in the form of india-rubber boats and provisions secured in waterproof bags, with good resolute oarsmen, the same passage might be safely made, and the actual course of the river mapped out, and its peculiar geological features properly examined.

5. The construction of bridges by a single span would be rendered difficult of execution, on account of the usual flaring shape of the summits. Possibly, however, points might be found where the mesas approach sufficiently near each other for such a purpose.

6. The width of the river, at its narrowest point, was estimated at 100 feet, and the line of high-water mark at forty feet above the average stage in August.

7. The long-continued uniformity of the geological formation (termed "white sandstone," probably cretaceous) is remarkable; but under the term may have been comprised some of the later stratified formations. The contrast on reaching the dark igneous rocks was so marked that it could not fail to be noticed.

8. Any prospect for useful navigation up or down the cañon during the season of high water, or the transportation of lumber from the upper pine regions, could not be regarded

as feasible, considering the long distance and the inaccessible character of the river-banks.

9. No other satisfactory method of exploration, except along the course of the river, could be adopted to determine its actual course and peculiar natural features; and James White, as the pioneer of this enterprise, will probably long retain the honour of being the only man who has traversed, through its whole course, the Great Cañon of the Colorado, and lived to recount his observations on so perilous a trip.

SINCE the above was written the whole series of cañons through which the Colorado and its main branch, Green River, flow, have been thoroughly examined by a small party of explorers under Major Powell. I had the pleasure of meeting him at Cheyenne in October last, on his way back to the East, and received from him a full account of his adventures, illustrated by the maps he had made on the journey. A short account of this expedition, written by Major Powell, appeared in some of the American papers; and as the subject is of such great interest, I have thought it desirable to re-publish it in the Appendix (see Appendix D).

All lovers of geographical research will hail with delight the full details which Major Powell is now preparing of the most remarkable exploration yet made in the Great West.

W. A. B.

April, 1870.

CHAPTER XIV.

THE RETURN JOURNEY *viâ* SALT LAKE.

Leave San Francisco.—Ascending the Sierra Nevada on the Central Pacific Railroad.—Sledging across the Mountains.—Virginia City.—Our Fellow Passenger.—Staging across the Desert.—How we crossed an "Alkali-flat."—Austin.—The Mormons.—Polygamy.—Will they migrate or will they remain?—The Anti-polygamy Party.—Mr. Dilke on Mormonism.—The Electric Telegraph in the Desert.—Cross the Black Hills.—Cheyenne.—Drive to Denver.—Enormous herds of Antelope and Buffalo.—Fort Wallace again.

LATE on the afternoon of February 21st I started from San Francisco, and took the river boat for Sacramento, where next morning I was joined by Palmer and Colton. We left the State capital enveloped in steaming drizzle, and were glad to exchange the sultry oppression of the coast for the snow-flakes and bracing air of the Sierra Nevada. We were told by the "conductor" of our train, as we left the depôt of the Central Pacific of California, that the mountains commenced two miles east of Sacramento. It is necessary to be told this fact, for to all appearance the country is a dead level, and the only way of accounting for it is, that so the government has decided.

The line does however ascend, though gradually, for sixty miles, at which point we entered the snows at an elevation of 2,700 feet, and very soon the mountain scenery became Alpine in its character, and snow-clad giants appeared and disappeared amongst the clouds and drifting snow-flakes. The train twined in and out amongst the mountains like a serpent; sometimes clinging closely to the edge of a precipice

whose depth was lost in the mist below, sometimes crossing deep ravines on lofty tressel bridges, now dashing through a tunnel, then entering a mile or two of snow-sheds, and at times whirling round so sharp a curve that we felt as if centrifugal force would send us flying off the rails. Higher up, the grades became steeper; another engine was added as a pusher to the train, and our speed was much reduced. The vistas up and down the ravines between the mountains were superb; the graceful Californian pines, with their dark foliage, seemed to rest their heavy limbs upon the white glistening breasts of the hills, for so deep was the snow that the bare portions of the trunks were buried beneath it.

I was strongly reminded of one scene in Switzerland as we crept up the mountains—the pass of the Col de Balme into the Valley de Chamounix.

At thirteen miles from the summit we reached the temporary limit of the railway, and exchanged the warmed cars for the Overland Mail Company's sledges. There were half-a-dozen of these waiting our arrival, each drawn by three pair of mustangs, in the sleekest possible condition. The sun was setting, and a brilliant crimson tint was thrown for a few moments over everything as we dashed off with a chorus of whoops from the drivers, and shot like lightning over the hard crisp snow.

Those who cross the mountains by stage in summer enjoy quite an exciting drive; those who pass over them by sledge during the winter revel in scenes of inexpressible grandeur.

From twenty to forty feet of snow lies below you, the summits have to be crossed at an elevation exceeding 8,000 feet, the road is cut for miles along precipices whose edges are but vaguely visible to the stranger even by a bright moonlight, and the cold is intense, so much so that a dozen thicknesses

of shawl or blanket wrapt over your head fails to keep out the piercing icy blast. For all this there is so much life and excitement in the scene that even the drivers, who are accustomed to it, wake up from their usual stolid moodiness, and playfully "wake up" their horses also. How we dashed on through the snow, up hill and down dale, all through the night! About twelve o'clock we had a biting snow-storm, which completely covered the track, and left us nothing to steer by but the long row of poles which were stuck in the snow to mark the road. Much of the country upon the summit was level, or nearly so, and there the snow lay deepest. The lofty telegraph poles only just raised the wire above the surface, and many of the younger firs showed no more than their tops above the crust.

The track upon which we drove, or rather galloped, was only wide enough for one vehicle, and now and then all through the night one or other of the sledges would run off the beaten way and upset in the deep snow, dragging the horses after it, and burying them up to their necks. Then we would have to tumble out, and help to lift the sledge on to the track again. We all got upset in turn, and some of our parties twice; and occasionally we met trucks on runners, returning for fresh loads of railway iron, or sledges coming from the opposite direction. There was no room to pass on the track, so that one or other had to run into the snow, and submit in cold blood to being upset.

Thus the night went by. We changed horses every sixteen miles, and arrived by morning at the head of Donner Lake, at the eastern slope of the sierra, where the snow had already thawed so much that we were obliged to leave our comfortable sledges and proceed by mud-wagon to Virginia City, about eight hours farther on.

A mud-wagon is shaped like a coach, but it is hung lower, is more heavily built, and has its sides made of canvas instead of wood and glass.

Most of the passengers who occupied the six sledges were booked for Virginia City; where, next morning, we learned that only two were going to join us across the Great Basin. We were discussing after breakfast the merits of the different silver mines, and trying to decide upon which to visit on the famous Comstock lode, when a very tall and bulky man, his hair cropped as close as that of a convict, with a round, jovial, beardless face, and enveloped in a huge overcoat made of the thickest of Californian blankets, offered his services in the most friendly way, and took us to the Savage Mine, where we watched the rapid extraction of the grey and white quartz, many pieces of which were glistening with silver.

The Comstock lode and the silver mines which ramify through it have been too often described to require any comment here. Our bulky friend, the jovial proprietor of the Occidental Hotel of San Francisco, may not be as well known in the East as he is throughout the Far West; and since he became from this time the most prominent feature of the homeward journey, I must describe our start from Virginia City, and introduce him in doing so.

When Palmer, Colton, myself, and another passenger, had seated ourselves and packed away our wraps and blankets, to use whenever any great increase of elevation should make it very cold, the agent called out for Mr. Leland, and as Mr. Leland did not respond to the summons, he had forcibly to be conducted from the bar-room by his friends (to whom he had been saying good-bye in the usual manner nearly all the morning), and pushed with difficulty, blanket, coat, and all, through the door of the mud-wagon; then came half-a-dozen

blankets to match the coat, and sealskin boots reaching to the hips; then a large bag, labelled "muck-a-muck," which he soon informed us was food for the journey, should we need anything between times; then came a gallon keg of whiskey, then a second ditto, then a third, a fourth, and, lastly, a demijohn of the same. Bang went the door! "All aboard? Whoop!" shouted the driver, as he cracked the whip over the leaders; and thus, amidst a chorus of cheers from our new acquaintances, and a long string of messages to Tom, Dick, and Harry from the stentorian voice of Leland, as he bid them good-bye, we bumped and rattled through Virginia City. The whiskey was all finished before we reached Salt Lake; and, although it was at times a nuisance, and notwithstanding the fact that the owner of it drank with every one along the road, whether they wished or not, it was, nevertheless, a source of great amusement, and probably helped the horses, *through the driver*, out of many a "tight" place.

Travelling day and night by stage across 700 miles of desert is wearisome at all times, but it is especially trying when the frost first breaks up, and the soft, friable soil is converted into mud which is slightly frozen over at night, and lets the wheels sink through it to the axletrees. This happened to be our case. Had we been one week earlier, we could have gone upon a smooth road from Virginia City to Salt Lake in four days. As it was, our average rate of progression was reduced to two miles and a quarter per hour. All the "alkali flats" were flooded and covered with ice, too thin to bear, but quite thick enough to damage the legs of the horses; the ruts were terrible, and both through the day and night we were jolted, first on one side, then on the other, and thrown violently forward into the arms of our *vis-à-vis*. Every now and then the driver would call out, "Left!" or

"Right!" which meant that those inside were to bear all their weight on the side named, to prevent the wagon from being upset on the other. Twenty times at least we stuck in the mud, and had to spend hours in digging out the wheels; and there was not a single night in which we had not to turn out and walk over some especially bad place.

On one of these occasions, the driver pulled up at the edge of a large sheet of water, covered with about an inch of ice. It was bitterly cold, and there was no moon; the ground was so boggy that it was very doubtful whether we could possibly reach the opposite shore, two miles distant, and yet we could not stop where we were. This time we were drawn by four powerful horses; and it was at last decided that Colton, the other passenger, the driver, and myself, should first ride the horses across, and then that they should return for the others. How we got through it I can hardly say; the water reached above the horses' girths; every instant they would lose their footing in a cart-rut or a boggy spot; at some places the ice would almost bear, and then it would suddenly break and let us through. We reached the other side, however, soaked to the skin, and fast stiffening, as our clothes froze around us. Back went the horses; but when the driver contemplated the probable fate of seventeen stone, enveloped in a Californian blanket coat, attempting to cross an alkali flat, his heart failed him, and he determined to put the horses to again. In the course of a couple of hours, the horses succeeded in getting the wagon across, and we all went on again. A little farther we met another stage, which, from the steady appearance of the lights, as seen from a distance, was evidently at a standstill. This mud-wagon was buried up to the body in mud; it carried no passengers, but was heavily laden with bars of silver, which lay at the bottom of the wagon. The

driver, being alone, could do nothing; so we set to work, took out the silver, dug out the wheels, and fastened our own horses in front of the others. Having set this "outfit" moving again we started afresh, with very considerable doubts however as to how it would get through the alkali flat.

Time, of course, could not be kept, and we took our meals at any hour during the day or night; at last we became so demoralised that no distinction could possibly be discovered between breakfast, dinner, or tea; so that all went indefinitely under the name of supper. We usually supped once every eight hours, and did not therefore suffer from want of food.

About half-way across the desert, four days from Virginia City, we reached Austin, at which thriving mining town we rested for a night, and enjoyed the luxuries of a dinner, a bed, and a breakfast. Nothing is more surprising than the good fare which can be had at most of the mining towns in California and Nevada. Our dinner at the French restaurant was fine; we had fresh oysters from San Francisco, large salmon-trout from the Humboldt River, and a variety of dishes beautifully cooked and served. We drank Perrier Jouet of the best quality, and claret which was not to be despised. Of course, the luxuries were expensive, but they were supplied on all sides to the groups of miners and others who were dining with us.

Two days' and nights' more travel brought us to the Mormon city, where we remained some time to recruit our strength and see the place.

"Have you been to Salt Lake?" and "What do you think of the Mormons?" were the two questions I had most frequently to answer on my return home.

Although the Mormons have been too much written on as well as "too much married," yet I do not altogether agree with

much that has been said of them lately, and shall not therefore remain altogether silent on this subject.

The English view of the Mormon question is very different from the American one; and as Utah is an American territory, not an English county, we should certainly consider the question from an American stand-point. In the first place, I deny the common assertion that Salt Lake City, setting aside polygamy, is a moral place, and that the Mormons

A Mormon Family.

are a moral people. Is it likely, in a community where men have almost unlimited license, that the women will practise strict fidelity to their *masters* (husbands)? Polygamy and strict morality have never up to the present time existed in company, and my impressions of Salt Lake City led me to conclude that the Mormons are no exception to this rule. Why should the Mormon elders mysteriously hint at

death as the punishment inflicted by them for female infidelity? Surely because they feel how impossible it is to maintain such fidelity in a community like theirs.

Every spot upon American soil, not occupied by the Mormons, is open to the world for trade or settlement; but a Gentile settler in Utah finds himself beset on all sides by so many petty annoyances, that he invariably decamps. Letters advising him to join the community are followed by others of a threatening character; and if these fail to *convert him*, more active means are taken to prove how useless, and even unsafe, it is for him to resist the pressure of Mormon tyranny. Only conceive how offensive this is to the feelings of Americans!

The degradation of women, however, is the deepest grievance of all. There, in the midst of a country where woman appears to stand higher than anywhere else—where she is, on the whole, better educated—where her influence is greater, and where more homage is paid to her—a community rises up which is trying to lower her position to that of a servant in her own household. It may be very utilitarian, but it is extremely revolting to a people so sensitive on this subject as the Americans. It is rare to hear a Mormon husband talk of his wives, he always calls them *his women*, and this little fact speaks volumes. Usually, if you dine at an elder's table, his guests will be men, and his wives will wait upon the party.

It is customary to envelop Mormonism in a highly-coloured cloud of religious fervour; we are told how devotedly they trust to the guidance of God; how strict they are in their religious observances; how they bring religion into their daily life, and walk as saints upon earth. In reality, however, there is, amongst the Mormons, an entire

absence of religious devotion. To an ordinary individual, they appear to worship no deity but the works of their own hand—not wood and stone exactly, but coin and fruit-trees, factories and theatres. Their text is the old one—that Providence will help those who help themselves; and their whole religious teaching, if such it may be called, is pure utilitarianism. They may convert the poor people of Wales and Norway by concealing the truth; but it is very doubtful whether they ever make one true male disciple in America—that is, one who joins them from religious conviction, and that alone.

The day after leaving Salt Lake City we picked up a very curious little fellow on the road. He was a hump-backed German Jew, and expressed strongly in his features that quick and combative form of mental development traditional to dwarfs. I was much amused at one remark he made, and it very well expresses the general opinion amongst frontier men. We were all standing over a blazing log-fire at a ranche in the Bitter Creek country, and I was listening to a tall Western man as he laid down the law on the Mormon question, when one of the party remarked in the forcible language of the country, that he could not conceive how any man could have the bare-faced impudence to set himself up as a Christ amongst the people, as Brigham Young has done. At this, the little hump-back squeaked out from one corner, "He ish right! he ish right! How much monish do you shuppose he hash made?"

In truth, the Mormons are becoming very wealthy; and, indeed, they are not the only section of the "faithful" who have profited by their position on the great highway of travel across a continent. Besides, their colonization system is perfect, their government is very effective, and the taxation-

screw is not applied until the settler is firmly rooted; then, however, it is sharply turned, and the man finds, when it is too late, that he has to pay very dearly for the start given him in life by his Mormon brethren.

It is interesting, although not perhaps very profitable, to speculate on the future of these people.

Will they migrate, or will they remain? Will they modify their views and actions, or will they hold out against Americanization? The last year or two has shown, I think, what course events are likely to take. The Mormons know perfectly well that they will remain unmolested and in full possession of all the lands they have taken without acknowment from the United States' Government, if they only give up polygamy. They may profess to believe what they like, and govern themselves as they please; but if they persist in degrading women as they at present do, some method will be devised to break up the "institution." Under the influence of this argument, the Joe Smith anti-polygamy party are making rapid strides, especially among the outlying settlements scattered over Utah and southern Nevada; and even the most orthodox of the saints are beginning to discover that polygamy is not an essential doctrine. Even the great Brigham has, I am informed, lately stated openly that he has received no direct revelation on this important subject; and that therefore, at present, although he is in favour of it personally, he cannot speak with authority either for or against the practice. This is fortunate, and leaves a very safe loophole for escape in time of need. The institution is very unpopular amongst the majority of the women, especially the younger ones. I used to discuss the subject a good deal with a young Mormon wife of great intelligence, and although she professed to approve of it to me, I found out

that she had insisted upon her husband's relinquishing the idea of taking a second wife into her own household.

The rank and file of the faithful are also becoming a good deal enlightened as regards the payment of tithes. They do not give so freely as formerly; and the loud complaints made by the bishops and elders on this head only prove how widespread is the feeling that they are being heavily taxed to no other purpose than that of maintaining a system of tyranny dignified by the name of "church government." "If," say those who are averse to polygamy, "we only do what is natural to our race, and refrain from marrying more than one wife, there will be no need then for maintaining a strong military organization, since the incentive to molestation will have been removed." This argument is one of the chief causes which makes the Joe Smith schism of such importance, and it may eventually break down the whole system. I certainly expect in time that the American forms of thought, which are so deeply rooted in the hearts of the masses, will prove to be too strong for Mormonism as it now exists, and that instead of any violent measures being necessary to remove the obnoxious sect to some more distant wilderness, its tenets will become modified into some system which can be tolerated while it lasts; for eventually it will die away, as thousands of other similar abnormalities have done since Christianity has been established.

Mr. Dilke, in writing on this subject, says: "Mormonism comes under my observation as the religious and social system of the most successful of all pioneers of English civilization. From this point of view it would be an immediate advantage to the world that they should be driven out once more into the wilderness, again to found an England in Mexico, in Polynesia, or on Red River." I cannot agree with him;

first, because I consider that even Mormon polygamy has the elements of social corruption and decay inherent; secondly, because if rapid emigration and colonisation be the great desideratum, we can obtain these ends far better by other means than that of Mormonism—an institution which he himself admits must give way again and again to the advancing tide of Christian Saxondom; and thirdly, because I have yet to learn what kind of colony that will become which was founded originally upon Mormon principles.

In crossing the western desert on the Salt Lake route, you are never removed more than thirty miles from telegraphic communication with the civilized world. The system adopted on this line, as well as throughout the United States generally, is a most admirable one. Every message is ticked out simultaneously in every office all along the line; it is reproduced perhaps a hundred times at the same moment, and usually the office clerk takes no notice of it unless it is intended for his own station; then he listens to the ticking of the instrument, and writes off the message from the sound. All along the route there is a station every fifty miles, and as the impeachment trial of President Johnson was just commencing while we were on the road, our first inquiry on reaching one of these stations was whether there had been any fresh news from Washington. Sometimes the clerk would say that some messages had passed through for San Francisco, but he had not been attending to them. Sometimes he had the very latest news to give us of events which had only just transpired, the first of these being the impeachment itself; and not unfrequently a long abstract of speeches delivered in the Senate on the same day were traversing the wires whilst we were waiting at the station, and the clerk was able, without the least trouble, to give them to us word for word as

they were ticked out in passing. Many scraps of European news reached us in this way, and made it hard to believe that we were 6,000 miles nearer sunset than those who spoke to us through the wires. Brigham Young has private telegraph wires laid down all over Utah and the Great Basin, uniting his isolated communities with the central seat of government. These all enter his house near the Tabernacle.

We accomplished the 1,350 miles from San Francisco to the foot of the Black Hills by means of four kinds of conveyance; 124 miles were travelled by steamboat, 92 by rail, about 250 by sledges, and the rest in mud-wagons. The 250 miles of sledging were divided into five intervals of from 30 to 100 miles each, in which we crossed the highest mountain summits on the route; these were the Sierra Nevada, the Wahsatch Mountains, Reed's and Bitter Creek summits, Bridger's Pass, and the Black Hills. Such changes broke the journey, and rendered it much less fatiguing than it otherwise would have been. On reaching the station at the foot of the Black Hills, where the stages branch off to Denver and the south, we found that a heavy fall of snow had stopped the traffic by train along the Platte route; but as the storm had not extended as far west as the Rocky Mountains, travel was still open to Denver, and thence by the Smoky Hill Fork, our old route, to St. Louis. We woke up Leland, who was asleep in the boot—his favourite resting-place, but how he squeezed into it has ever remained a mystery—and held a consultation as to whether we should go on to Cheyenne or take the coach for Denver. The deliberations ended in a general break-up of our little party of four. Colton started off to see how the tunnel was progressing in Evan's Pass, Leland went on in the stage to Cheyenne, where he expected to meet many friends, and to get some refreshment before continuing his journey,

and Palmer and I took the world easy. We got a shake-down on the floor of the ranche or stage-station, and had a good night's rest preparatory to starting for Denver by the mid-day stage on the morrow.

The Denver stage started for Cheyenne at seven o'clock, so that it reached our ranche about mid-day. As it came in sight we quickly spied a well-known bulky figure, enveloped in an equally well-known blanket coat, seated next the driver. His cap was on the wrong way; and when all the passengers had rushed from the stage to make the most of the twenty minutes allowed for refreshment, he alone remained master of his commanding position. "Well, Leland," we asked, "what do you think of Cheyenne?" "Pretty good sort of town for its size, Gen'l, but it is the most warlike place I was ever in. Whiskey! It's not whiskey at all, nor blue lightning either, its nitro-glycerine, you bet!" "But won't you get down, old fellow?" we suggested. "No, thankee," was the submissive reply, "I think I'll take a sleep in the boot."

The drive from the foot of the Black Hills to Denver was a glorious one, and occupied about nine hours. The same man drove us the whole way; his cattle were of the best, for traffic had been very light of late; and as the thaw had not reached this part of the route, the road was in splendid condition. During the whole distance of eighty miles we averaged nine miles an hour, including stoppages. The Rocky Mountains lay in full view of us all the way, gradually increasing in grandeur as we neared Denver; the moon was very brilliant, and the view over the plains to the eastward presented an endless expanse of undulating whiteness, upon which the moonlight played like phosphorescence on the sea. The complete solitude, the vastness of the expanse on all sides, the clatter of the four-in-hand as they dashed

Vincent Brooks Day & Son lith

along at a gallop, the keen sharp air, and the refreshing influence of a long night's rest made this drive inexpressibly delightful.

Three days passed quickly away at Denver, after which we again took to the stage, and continued our route southward to the end of the Kansas Pacific Railway, whose terminal depôt was at that time called Coyote. It was situated 295 miles from Denver, and ninety-two miles east of Fort Wallace, the old starting-point of our survey.

Between Denver and the fort we had no fear of Indians, nor need of escort, for the snow was yet on the ground, and the time for hostilities had not commenced. Big game, however, was most abundant here. One herd of antelope was so large that, although they commenced to bound like lightning across the road in single file as soon as they caught sight of us, the tail of the herd nearly came in contact with our leaders. Like many other wild animals which congregate in herds and follow a chief, all considered themselves bound to keep exactly in the same track. As for the buffalo, they were in prodigious numbers. I had heard of wagon-trains being stopped for a whole day to allow them to go by, of thousands taking fright and rushing helter-skelter over everything, and of places where it was absolutely necessary to provide against a stampede; but such a sight I never expected to see, and should never have witnessed had I returned, as I had expected, by the Platte.

On one occasion, about 150 miles from Denver, to the left of the road, as far as the eye could reach, that is for very many miles, the plain was completely covered with them. There were thousands, millions if you like, for such numbers were beyond calculation, and perhaps the best idea I can give of such a sight is to refer to the accompanying sketch,

which gives a fair idea of one of these countless herds of American bison.

Early in the morning of the 10th of March, 1868, we came for a second time in sight of Fort Wallace. I was sitting next the driver, and the sight of the red buildings and Sibley tents reminded me painfully of the scenes which had been enacted there during my last visit. I pointed out to the driver the ground upon which the Indians had fought our men, and I told him that there we had lost nine men killed and four wounded in one engagement. He turned slightly round, and gave me a curious look of suspicion as he said, "Now there I guess you lie, for I happened to be in every brush we had with the Indians along this here road last summer, and although we lost ones, and twos, and threes, some fours, and a five, we never lost nine at one time, I'll swar." He thought I had referred to a stage-coach skirmish.

But two of the old officers remained at the fort, the others had gone elsewhere, and one poor fellow had been killed by the red-skins. We stopped for an hour, and had a talk over the incidents of the summer. There were three companies now established here. All the houses which were being built when I knew the post were finished, and a fine hospital had been added, composed entirely of the building stone found in the vicinity. Next morning we reached the rail, and thus returned to St. Louis.

PART IV.

THE PACIFIC RAILROADS.

THE PACIFIC RAILROADS.

CHAPTER I.

HISTORY OF THE PROJECT.

If we were to start from the very commencement of the Pacific Railroad project and trace its gradual development, we should glance in succession over all the great events which have crowded so thickly upon each other during the last twenty years of North American history. All influenced it one way or another, some retarding and others hastening it towards maturity. At the close of the Mexican war in 1848 the people of the United States found themselves possessed of the whole country lying between the Mississippi and the Pacific Ocean. California, New Mexico (now New Mexico and Arizona), and Texas were then united under the one flag; and not long after this event the Pacific Railroad question became a pet subject for speculation amongst the most advanced promoters of railway enterprises.

The first printed notice of such a scheme, however, dates much further back, for in the *New York Courier* of 1837, an article was written by a Dr. Hartley Carver, advocating a Pacific railway. As is usual in such a case, the doctor had his reward; by some he was considered a wild enthusiast, by others a madman.

One year only after the conclusion of the Mexican war

came the cry of gold, which sent thousands of miners from every quarter of the globe, by every route, to California and the Pacific coast. Whilst the greater number went by sea around the Cape and across Panama, thousands boldly set out from the Eastern States by land into the unknown regions of the Far West, and crossed the continent by different routes on different parallels of latitude.

Under the stimulus of this fresh necessity for a trans-continental highway, the Pacific Railroad enterprise could no longer be kept out of Congress; and early in the decade of 1850 it received the cordial support of both branches of the legislature. By an Act passed March 31st, 1853, the War Department was entrusted with the task of making such explorations and surveys as it might deem advisable in order to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean, and the necessary appropriations were duly granted. The Secretary of War at that time was none other than Mr. Jefferson Davis, and the result of the explorations made under his direction between 1854 and 1857 are comprised in the thirteen bulky volumes of Pacific Railroad Reports, which are as well known to botanists, naturalists, and geologists as to geographers and engineers.

Two-thirds of the territory of the United States lies to the west of the Mississippi, and crouched along the centre of this vast tract, barring off as was supposed the westward wave of population, stretch the Rocky Mountains—that great Grisly Bear, over whose body it was thought impossible to step; but these Pacific surveys threw great light upon the anatomy of the Grisly Bear. They proved that his back was very broad, that the slope up his sides was very gradual, that his spine did not extrude unpleasantly in the centre, but

lay, on the contrary, rather sunk between the two rows of muscles or mountains on either side. They found depressions along the spine—such as the North, Middle, South, and St. Louis parks—shut in on each side by the rows of muscles which made the animal so formidable. They showed, moreover, that, although he had a hump on his back (the centre of Colorado), from which his muscular frame sloped down on all sides, yet that this was flat also, and could be surmounted, if necessary, even by a railroad; that his body ended about the 35th parallel, only leaving an insignificant tail in the way south of that line; and also that his broad shoulders (the Laramie plains), although exceeding 7,000 feet in height, were so smooth and rounded off that they almost invited the pathfinder to choose this place for crossing in preference to any other.

The chief routes examined and reported upon were the following:—

1st. Between the 46th and 48th parallels, to unite Lake Superior and the head of navigation on the Mississippi with Puget Sound and the Columbia River. This has developed into the North Pacific Railroad route.

2nd. Between the 41st and 42nd parallels, to unite the Missouri River at Council Bluffs (Omaha) with the harbour of San Francisco. This has developed into the Union Pacific Railroad.

3rd. Between the 38th and 39th parallels, from Westport (Kansas City), at the great bend of the Missouri, due west across the continent. This was an attempt to run an "air-line" straight over the hump on the bear's back through the centre of Colorado, and thence in a direct line to San Francisco. The muscles on the eastern side were found to present no insurmountable obstacles, and one of the depressions (the

St. Louis Park) along the spine was easily crossed; but the muscles on the other side, and the furrows or gorges between the ribs made this route quite impracticable.

4th. Near the 35th parallel from Fort Smith, on the Arkansas River, to the harbour of San Pedro (Los Angeles) on the Pacific coast. This route, with the important modification of changing the starting-point to Kansas City on the Missouri, and the Pacific terminus to San Francisco, is the one proposed by the Kansas Pacific, which stands in the same relation to St. Louis that the Omaha line does to Chicago.

5th. Near the 32nd parallel, uniting Preston on the Red River in Eastern Texas with the Pacific at San Diego, San Pedro, or San Francisco.

When all these surveys had been completed, and Mr. Davis had carefully weighed and examined the results, this last route was the one to which he gave the preference, strongly urging its adoption by Congress. It was said with perfect truth, that if the Atlantic and Pacific Oceans were to rise to the height of 4,000. feet they would meet about the 32nd parallel of latitude over the vast plateau south of the Rocky Mountains—the Madre Plateau; while the greater part of the continent to the northward, as well as the lofty plateaux of Mexico to the south, would form two huge islands, separated by this strait. Although the surveys across other sections of the continent had almost swept away the conventional idea of the Alpine grandeur of the Rocky Mountains, yet they were too rapidly conducted, and the task was too great to remove minor obstacles, which swelled the estimates of the cost of a trans-continental railway to sums which made such an undertaking appear all but hopeless. The level route by the 32nd parallel shone out in striking economic contrast to all the rest, and the result was that

10,000,000 dollars were immediately given to Mexico in payment for shifting her boundary line a little farther south to make way for the railway.

Between 1853 and 1860 the political horizon was gradually assuming a lowering aspect. The storm was gathering which ultimately revolutionised the Pacific Railway question, as it did almost every other great question throughout the States. Whilst Southern influence appeared to be, as usual, carrying everything before it at Washington, and the truce brought about by the Missouri compromise was being respected in the East, the vital questions of slavery, State rights, and the rest, were being solved in the Far West throughout "bleeding" Kansas, Arkansas, Missouri, and the surrounding territories, with a freedom and rough rapidity natural to the condition of the inhabitants. The climate influences were adverse to slavery and weighed heavily on the side of those emigrants who poured in from the Free States with an ever-increasing majority, bringing with them political emotions verging on fanaticism, and a fixed determination to uphold the laws of equal justice to all men at any sacrifice. The pro-slavery platform was defeated in the West, war followed as a direct consequence, and the almost matured project of constructing a Southern Pacific Railroad by the 32nd parallel fell through as a matter of course.

The Pacific Railway question soon took another form. Statesmen whisperingly asked each other, What if the Pacific States were to waver in their loyalty to the Union? Their isolated position was for the first time keenly felt, and thus the necessity of binding California closely to the North by iron ways laid across the continent, became the highest card held by those who made it their business to agitate for a Pacific Railroad. Again the question came prominently before Con-

gress; but, before watching the result of this political contest at Washington in 1862, we must glance for a moment at the hands of the players.

California held some great cards. The production of gold had been enormous; agriculture had developed into an interest rivalling that of mining; cereals were raised in quantities far exceeding the local demand; southern California had added grape culture to stock raising, and was striving to export wine as well as hides and tallow; trade had sprung up with Oregon, the Sandwich Islands, and, most important of all, with China; quicksilver was almost flowing from the mines of Almaden, and the strong desire felt by the Californians for a Pacific Railroad was brought to a climax by the discovery that a practicable route across the snow-clad sierra did exist through Donner Pass, midway between San Francisco and Virginia City. Some of the richest merchants pledged their entire fortunes to the scheme; the State Legislature liberally gave its sanction and aid; and it only remained for Congress to grant a fitting subsidy. Nevada had one high trump card to play in support of California. The Comstock lode had been discovered, and the wealth of silver which poured from it had already raised that Territory into the council of the States.

Chicago and the north-west backed by New York, and St. Louis and the middle States supported by Philadelphia, carried with them to Congress most powerful but antagonistic influences. The railways of the eastern States and their prolongations westward may be said to form two separate railway systems, the one having Chicago in the north-west as its western terminus, the other St. Louis, the most central point in the Mississippi valley. The capitalists of both these cities, fully alive to the importance of directing the Pacific

trade through their own commercial centres, came forward eager for the contest which would bring so much triumph and profit to the winning side. The men of Chicago urged that they had already projected three lines across the State of Iowa to meet at Council Bluffs (Omaha), where they were bridging the muddy Missouri; that from this point to the Rocky Mountains, Nature herself had graded a line for them up to the very summit of the continental watershed, that here only a few hills had to be crossed, that another 500 miles would take them to the great Mormon settlement at Salt Lake, and that their Californian friends assured them that the Sierra Nevada might be crossed at the back of Virginia City, and San Francisco reached, without any insurmountable difficulty.

St. Louis, on the other hand, pleaded that she had passed from words to deeds; that lines westward had not only been projected but built; that the Missouri Pacific Railroad, commenced in 1857 with aid from the State, already ran straight as an arrow westward across Missouri to Kansas City; and that, lastly, as Kansas (not Nebraska) was the "mediterranean" State, and St. Louis more central than Chicago, Kansas City and not Council Bluffs, should be the starting-point of the grand route westward. Money was spent like water in the contest. I remember seeing it stated in an American journal that one company alone "employed the element of influence" to the extent of three millions of dollars. The civil war was hotly raging on all sides, and the whole nation was in a ferment. Five hundred thousand pounds sterling were leaving the treasury daily to meet the current expenses of the Northern armies; even Washington was threatened, but for all that the Pacific Railroad Bill was carried triumphantly. Grants of land

and a large subsidy, increasing in amount as the line advanced westward, were granted, but no definite conclusion was arrived at as to the eastern starting-point of the route. The great precedent, however, was established—that Government aid, to the extent of about half the total amount necessary, would be provided out of the national treasury to assist a Pacific Railroad enterprise. Bills succeeded each other in rapid succession, and party contests raged hotly at every session; until, finally, the following programme was definitely adopted, and the undertaking was actually commenced.

The main line was to extend from Omaha on the Missouri River to Sacramento, in California, 1,721 miles. St. Louis was to be provided for by a subsidised branch line to connect with the main line on or about the 100th meridian of longitude east of the Rocky Mountains. Three companies were to prosecute these works, and to stand on an equal footing as regards land grants, loans, mortgages, &c.

First: the Union Pacific Railway Company, constructing the line westward from Omaha.

Second: the Central Pacific Railway of California, proceeding eastward from Sacramento. These companies were to make their roads as quickly as possible from either end, and to meet at an intermediate point not fixed. Thus it was to the advantage of each to lay as much track as possible; for the amount of Government subsidy, as well as the share of managemental influence, depended upon the proportion of line laid.

Third: the Union Pacific Railway Company (Eastern Division) obtained the Government subsidy for a distance of 400 miles west of Kansas City. Thus it is evident that Chicago had gained the day. If the civil war had not intervened I

think it more than probable that although 1869 might not have seen the locomotive plying between New York and the Pacific, we should never have had an iron road laid across the Black Hills. Chicago would have built the branch line, and the main trunk would have been laid farther south, below the barrier of winter snows; it would have passed round the Rocky Mountains, not over them; across productive valleys, instead of through worthless deserts; and along the rich central trough of California, instead of climbing an alpine pass more than 7,000 feet above the Pacific.

The chief clauses of the Government grant are these:—

Congress confers upon the three companies mentioned the right of way through all its territories, an absolute grant of 12,800 acres per mile of the public lands through which the roads run; *i.e.*, alternate sections of one by twenty miles on each side of the line; the right to use the coal, iron, timber, &c., thereon; and authorises a special issue of United States' Bonds, bearing 6 per cent. interest, proportionate in amount to the length and difficulty of the lines, to be delivered to the companies as the works progress; and, as short sections of the road (usually twenty-mile sections) are passed by the Government inspectors as being satisfactorily completed.

The distance from Omaha to Sacramento is 1,721 miles; and the grants of bonds are as follows:—

Between the Missouri and the eastern base of the Rocky Mountains (525 miles), 16,000 dollars per mile; Rocky Mountain section (150 miles), 48,000 dollars per mile; Salt Lake section (900 miles), 32,000 dollars per mile; Sierra Nevada section (150 miles), 48,000 dollars per mile. Total issue in bonds, about 50,000,000 dollars. The Kansas branch received a subsidy of 16,000 dollars per mile for 381 miles; and other short branches were similarly subsidised.

The time of maturity for these bonds is placed at thirty years after date of issue. They are made subordinate—standing in the position of a second mortgage—to the bonds issued by the companies, under the following important restrictions, viz.: That the railroads and telegraph lines be kept in proper repair; that the companies shall always give Government dispatches, munitions of war, &c., the preference when required, and shall not charge higher rates for their transmission than are paid by private parties for like services; that all compensation for services rendered to the Government shall be applied to the *payment of said bonds and interest* until the whole amount is fully paid; and that at least 5 per cent. additional of the net earnings of the railroads shall also be annually applied to the liquidation of the Government bonds as soon as the roads are completed. The Californian Company, on consideration of the natural obstacles to be surmounted, were allowed to retain during construction one-half of the compensation for services rendered to the Government.

Mortgages, equal in amount to the subsidies, were authorised to be issued from time to time as first mortgage bonds, bearing the same date, time of maturity, and rate of interest as those loaned by the Government. A small amount of capital stock was subscribed in each case. Thus the two railway companies which have just completed the Salt Lake line state their construction resources as follows:—

UNION PACIFIC RAILROAD.

CONSTRUCTION AND EQUIPMENT RESOURCES FOR 1,100 MILES OF RAILROAD.

	Dollars.
United States' Bonds	29,328,000
First Mortgage Bonds	29,328,000
Capital	13,243,000
Total	71,899,000

I have purposely omitted the land grant of 14,080,000 acres, as it is not immediately available for income.

CENTRAL PACIFIC OF CALIFORNIA.

CONSTRUCTION AND EQUIPMENT RESOURCES FOR 726 MILES.

	Dollars.
Donations (without lien)	11,225,000
Capital stock	8,000,000
Net earnings to 1867	1,520,235
Bonds (State guarantee)	3,000,000
First Mortgage Bonds	25,517,000
United States' Bonds	25,517,000
Total	74,779,235

Fourteen million dollars of this sum represent the liberality of the State of California and its wealthy citizens, and form an additional source of revenue for which the eastern company has no equivalent.

These sums are far more than sufficient to carry out the work according to the American system; but neither company will either require or call up all this capital, for both lay claim to building a greater mileage of road than the total length requires. They met on the 11th of May about the meridian of Salt Lake; thus giving 726 miles to the western company, and 995 to the eastern.

CHAPTER II.

THE OMAHA LINE (UNION PACIFIC AND CENTRAL PACIFIC OF CALIFORNIA).

THE Union Pacific Railroad runs through the Platte valley from Omaha to Julesburg (377 miles), and that of Lodge Pole Creek (a tributary) to the foot of the Black Hills, about 160 miles farther. Of these 537 miles, only the first 150 pass through land susceptible of cultivation. But one-fifth of Nebraska can be cultivated without irrigation, and the remainder cannot be irrigated because the scanty streams which traverse it are useless for that purpose. Beyond the limits between long. 98° and 99°, where the rain-fall is insufficient to raise crops, good grazing lands extend for about 100 miles, when we gradually enter a region so parched and barren that it can scarcely support a meagre covering of stunted grass. Three hundred miles of this arid region have to be crossed before the traveller, having imperceptibly ascended the slope of the continent to an elevation of 6,500 feet to the foot of the Black Hills, finds the pasturage improve, from its close proximity to the mountains. But as the Black Hills are low, they do not cause sufficient rain-fall to enable the farmer to settle on their eastern slopes. For 500 miles scarcely a tree is to be seen. The River Platte presents to the eye, at most seasons of the year, a vast expanse of sandy bed, often one mile wide, with a few trickling streams meandering like silver threads around innumerable sand-banks and islands, some few of which are covered with cotton-wood trees. These

beautiful clumps of foliage are soon left behind, and nothing remains to break the monotony of the undulating plains but the bluffs or cliffs which mark the edge between the sunken valley and the parched plateau beyond.

In the Black Hills some fine views of timbered country are obtained, and the dividing ridge is crossed with ease at an elevation of 8,262 feet, no grade being higher than ninety feet, and this only for a short distance. The Laramie plains are then crossed. They form, for the most part, a level upland plateau, exceeding an elevation of 7,000 feet. They are covered with good pasturage, particularly along the courses of the streams. During the short summer which exists here the ranche-men have found it possible to raise some garden vegetables; but even oats, although they come up well and form capital fodder, will not ripen. These plains are bounded on the west by a broad undulation, or range, forming the continental water-parting. No engineering difficulties occur here, and the Pacific slope is reached without a tunnel or any grades steeper than 75 feet per mile, which it is necessary to resort to for a short distance. One hundred and forty miles separate the Black Hills from this summit.

North of the Laramie plains lies the Sweet-water mining district, which is now attracting thousands of gold-diggers. South of it lie the gold-fields of Colorado, many of which are supplied at the present time with nearly all the necessaries of life from Cheyenne,—the Denver of these northern mining districts.

The sterility of these regions is not an unmitigated evil to the railroad which crosses them; for the miners, whose wants are very great, require all the necessaries and many of the luxuries of life to be carried to them by rail. A non-producing population—say of 1,000 miners—as well on account

of their migratory habits as their many requirements, is a larger source of revenue to a railroad than six times the population dependent upon agriculture, even if we disregard altogether the transportation of ores, an item often of the greatest importance.

After crossing the continental water-parting through a pass at Benton (near Bridger's Pass)—elevation, 7,534 feet—the railroad leaves the Rocky Mountains and traverses the Bitter-Creek country; crosses Green River, the main tributary of the Rio Colorado of the West; and reaches the foot of the Wahsatch Mountains. This country, 200 miles wide, is fairly represented by Mr. Stansbury, who accurately surveyed it, as consisting of "Artemisian barrens, with some pasturage on the streams." The water is bitter, sulphurous, or strongly saline; the earth is for the most part bare and rugged, showing the wear and tear of ages, and the cracks and fissures of the more recent water-courses. A more forsaken region I never saw.

The Wahsacht belt of mountains is sixty miles across, and the dividing ridge which separates the waters of Green River, which flow into the Californian Gulf, from the tributaries of Great Salt Lake, is crossed within the first twenty miles, without any heavy grades, at an elevation of 7,567 feet. Nature has herself cut a path through the remaining forty miles of mountain by means of two fine gorges, Echo and Weber cañons. Without the intervention of these extraordinary natural passes, the Wahsatch Mountains would have formed an insurmountable barrier to a railroad. The railroad thus reaches the shore of Great Salt Lake, thirty miles north of the Mormon city. It does not pass through this town, but turns northward around the lake, and then, bending westward, leaves the Salt Lake Basin and enters that of the

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THE WAHSATCH MOUNTAINS, FROM SALT LAKE CITY.

Humboldt; the rim separating these basins being here but 1,360 feet above the Lake.*

The inland or Great Basin region of North America extends from the dividing ridge of the Wahsatch Mountains to the summit of the Sierra Nevada, 721 miles by the railroad. It is a vast desert, considerably larger than France, covered with short volcanic mountain ranges; it possesses a fertile soil, but suffers from an insufficient rain-fall; none of its scanty streams enter the sea, but each discharges its waters into a little lake and remains shut up within its own independent basin. Rich silver mines are being discovered, year by year, all over the basin region, and the yield from them already equals in value that of the gold-fields of California. It contains three towns, Salt Lake City, Austin, and Virginia City; the railway passes within thirty-five miles of the first, 100 miles of the second, and sixteen only of the last.

The railroad follows the valley of the Humboldt River, from Humboldt Wells, north-west of Great Salt Lake, where it rises, to Humboldt Lake, not far distant from its "sink" (distance 280 miles), and reaches the base of the Sierra Nevada 100 miles farther westward.

From the Truckee River, elevation 5,866 feet, to the summit of the sierra, the distance is fourteen miles, and the ascent 1,176 feet, making an average grade of 84 feet per mile. From the summit, elevation 7,042 feet, to Colfax, on the western side of the range, the distance is fifty-one miles, and the descent 4,594 feet, or an average grade of over 90 feet per mile. In fact, the Central Pacific Railroad, starting from the Sacramento, only 56 feet above the level of the sea, reaches the summit of a mountain ridge exceeding 7,000 feet in 105 miles. Here all the engineering difficulties of the

* Elevation of Great Salt Lake, 4,290 feet.

line centre. Most of the heavy grading averages 95 feet per mile; for three and a half miles only is 116 feet, the maximum grade allowed by Congress, resorted to; there are thirteen short tunnels, making altogether a length of 6,262 feet. The longest is 1,700 feet. It is a very hard strain upon two powerful engines to drag ten passengers' cars with luggage up so steep an ascent, and the carriage of heavy freight is necessarily costly.

This bold undertaking has been carried out with an amount of energy beyond all praise. The road has been built, not by a staff formed of scientific engineers—they might have shrunk from so reckless a venture—but by a few go-ahead merchants of San Francisco, who left their counting-houses to become railway contractors. All last summer ten thousand Chinamen and about three thousand teams, were employed to grade and lay the track across the basin region. During the previous winter I saw them transporting long lines of sledges, laden with iron rails and ties, across the summit to the valley of the Truckee and the Humboldt. When the snow had sufficiently thawed to enable them to complete the tunnels, an average of 500 tons of ties, rails, spikes, bolts, and chairs were carried over the sierra, in fifty cars drawn by ten locomotives every day, and were sent from 300 to 400 miles to the scene of operations. Here two miles, and sometimes more, were laid per day, and each two miles required 500 tons of material for its construction. The rails usually weigh from 56 lbs. to 64 lbs. per yard.

For thirty miles across the mountains the snows of winter presented an obstacle which at first seemed to be insurmountable, but these Californians would not give in; they have covered the line with strong wooden sheds over the entire distance in which snows are likely to stop the traffic, and had

completed twenty miles of roofing on the 1st of January this year. It is hard, after so much has been done, to be obliged to pronounce this summit railway a mistake. Yet there is no question about it. Had the Sierra Nevada been more thoroughly examined before this gigantic enterprise was undertaken, Beckworth's Pass—thirty miles to the north, and only 4,500 feet in height—would most certainly have been adopted. So expensive is it to carry freight up such steep grades for so great a distance, that although the Central Pacific Company at present ignore the Beckworth route, they will be obliged ultimately to adopt it if the freight traffic at all equals their expectations. Although the engineering difficulties upon other points of the Pacific Railroad are not great, yet the rapidity with which the work has been accomplished is marvellous. It was not until January, 1866, that the first forty miles of railroad were laid down from Omaha; in January, 1867, 305 miles were completed; and in January, 1868, 540. In the meantime the Californian Company were hard at work tunneling, and had only ninety-four miles open to business on the 1st of January last year.

During 1868, 866 miles were added to the railway by the united companies; being an average of two miles and two-thirds a day, Sundays excluded, and the remaining 346 miles were completed in 107 days more. In the history of railway construction this rapidity has no precedent; and when it is remembered that for 1,600 miles wood for ties could only be obtained at three points accessible to the road, and also that the country is mostly an uninhabited desert, the result appears even yet more marvellous. The following quotation explains, in true American style, how the track is laid:—

"One can see all along the line of the now completed road

the evidences of ingenious self-protection and defence which our men learned during the war. The same curious huts and underground dwellings which were a common sight along our army lines then, may now be seen burrowed into the sides of the hills, or built up with ready adaptability in sheltered spots. The whole organisation of the force engaged in the construction of the road is, in fact, semi-military. The men who go ahead, locating the road, are the advance guard. Following these is the second line, cutting through the gorges, grading the road, and building bridges. Then comes the main line of the army, placing the sleepers, laying the track, spiking down the rails, perfecting the alignment, ballasting the rail, and dressing up and completing the road for immediate use. This army of workers has its base, to continue the figure, at Omaha, Chicago, and still farther eastward, from whose markets are collected the material for constructing the road. Along the line of the completed road are construction trains constantly 'pushing forward to the front' with supplies. The company's grounds and workshops at Omaha are the arsenal, where these purchases, amounting now to millions of dollars in value, are collected and held ready to be sent forward. The advanced limit of the rail is occupied by a train of long box cars, with hammocks swung under them, beds spread on top of them, bunks built within them, in which the sturdy, broad-shouldered pioneers of the great iron highway sleep at night and take their meals. Close behind this train come loads of ties and rails and spikes, &c., which are being thundered off upon the roadside, to be ready for the track-layers. The road is graded a hundred miles in advance. The ties are laid roughly in place, then adjusted, gauged, and levelled. Then the track is laid.

"Track-laying on the Union Pacific is a science, and we

pundits of the Far East stood upon that embankment, only about a thousand miles this side of sunset, and backed westward before that hurrying corps of sturdy operatives with mingled feelings of amusement, curiosity, and profound respect. On they came. A light car, drawn by a single horse, gallops up to the front with its load of rails. Two men seize the end of a rail and start forward, the rest of the gang taking hold by twos until it is clear of the car. They come forward at a run. At the word of command the rail is dropped in its place, right side up, with care, while the same process goes on at the other side of the car. Less than thirty seconds to a rail for each gang, and so four rails go down to the minute! Quick work, you say, but the fellows on the U. P. are tremendously in earnest. The moment the car is empty it is tipped over on the side of the track to let the next loaded car pass it, and then it is tipped back again; and it is a sight to see it go flying back for another load, propelled by a horse at full gallop at the end of 60 or 80 feet of rope, ridden by a young Jehu, who drives furiously. Close behind the first gang come the gaugers, spikers, and bolters, and a lively time they make of it. It is a grand Anvil Chorus that those sturdy sledges are playing across the plains. It is in triple time, three strokes to a spike. There are ten spikes to a rail, four hundred rails to a mile, eighteen hundred miles to San Francisco. That's the sum, what is the quotient? Twenty-one million times are those sledges to be swung—twenty-one million times are they to come down with their sharp punctuation, before the great work of modern America is complete!" (See title-page.)

Passing over all other collateral subjects, I must mention that an abundance of coal, sufficiently good to be burned by the locomotive, has been discovered in several localities near

the railroad, viz., in the Black Hills, 550 miles from Omaha; near Bridger's Pass, 130 miles farther west; on Bitter Creek, and some other branches of Green River; and lastly, some fine deposits are now being mined in Echo Cañon. None has been found between Great Salt Lake and the Pacific coast.

It has long been the opinion, however, of many railroad men in the States, that this great national highway should not have been constructed along the 41st parallel at all; and they have anxiously awaited the results of last winter's experience to prove or disprove the truth of their forebodings. The Senate Committee, in their Report just issued on the Pacific railways, say that "It is an undetermined problem if the Union Pacific Railroad between Omaha and Sacramento can be operated (*i.e.* 'worked') throughout the year. Of the elements to solve this question there are: First, the known effects of drifting snow upon the railway lines of Central Illinois, and the hilly districts of New England and Pennsylvania; second, the known depths to which snow falls and packs in portions of the Rocky Mountain region; third, the extraordinary height of the grades, and sharpness of the curves, in the passage of the Sierra Nevada. Railroad communication in Massachusetts, New York, and Pennsylvania, is often suspended in winter. These vicissitudes take place in States where labour is abundant, where the stations on the lines are very near together, where fuel and food, draught animals and tools, are plentiful and accessible. But the line between Omaha and Sacramento is at present almost a continuous wilderness—portions of it never will be settled; population is scarce; help in trouble, beyond that of the passengers and *employés* on the train, cannot be had; the stock of accessible fuel may be limited to the supply on the cars. If such interruptions should take

place, their effect upon the new trade from Asia to Europe across the United States, would be very damaging; they would characterise the route as one not to be relied on for international commerce."

It is comparatively easy to roof the line across a snow-belt of thirty miles through the Sierra Nevada, where timber is abundant; it is impossible to cover 300 miles of rail in the Rocky Mountains, where timber is either entirely absent or very scarce. As I remarked in a preceding chapter, I could not proceed eastward by the Platte route in March, 1868, even from Cheyenne City, on the plains, and was obliged to proceed southward by Denver, and strike the Kansas Pacific. The latest accounts from America confirm the gravest doubts of the Senate committee.

Last February there was a snow blockade for twenty days at Cheyenne, and on the Laramie plains traffic was completely stopped for five weeks, so that orders had to be given for all mails from New York to San Francisco to be sent for the time round by Panama.

Can anything be much more miserable than to be snowed up for a month in the Bitter Creek country? Yet this did occur as late as last March; fifty of the passengers arrived at Laramie Station, after walking ninety miles through the snows, at an elevation of over 7,000 feet above the sea; 150 passengers were left behind, and had not been rescued at the time I received the above information, although on April the 1st through traffic had not been resumed.

CHAPTER III.

THE KANSAS PACIFIC RAILWAY.

THE more advanced of the two Pacific railroads yet to be described is that which passes through districts already made known to my readers in previous chapters; it is therefore unnecessary for me to go over the ground a second time.

The Kansas Pacific Company has completed more than 400 miles of road, reaching to the borders of Colorado, and expects to complete its branch through Denver to the Omaha line, a distance of 321 miles farther, within the present year.

In the meantime, the Southern Pacific of California, which stands in the same relation to the Kansas Pacific as the Central Pacific of California does to the Union Pacific (or the Omaha line), had laid eighty miles of road in March, '69, and is fast "locating" a further section, which is to pass through the Panoche Pass, in the coast range, into the Tulare valley and west of Tulare Lake to Tehachapa Pass, in the Sierra Nevada.

The Report of all the surveys referred to in this book has just been published, and now lies open before me, forming a small volume of 250 pages; not written in the high flown, exaggerated manner of too many documents of a similar nature which we yearly receive from America, but full of information, which, although usually too condensed, is forcibly put and justly represented.

So extensive a surveying expedition was probably never

organised. The total length of routes accurately chained, levelled, and surveyed by instruments, is no less than 4,464 miles; and a considerable distance more was examined, and the various elevations barometrically obtained. These

UNION PACIFIC RAILWAY.			KANSAS PACIFIC RAILWAY.		
	Distances. Miles.	Elevations. Feet.	Elevations. Feet.	Distances. Miles.	
Missouri River at Omaha		968	543		Missouri River at Kansas City (Mississippi Basin.)
Forks of the Platte	290	2,330	3,725	525	Arkansas River at Fort Lyon (Mississippi Basin.)
Foot of Black Hills	228	7,040	4,266	50	Mouth of Chequaco Valley (Mississippi Basin.)
Evans' Pass	31	8,242	6,166	40	Cimarron Pass (Raton Mtns.) (Mississippi Basin.)
			5,634	64	Red River (Mississippi Basin.)
			6,233	76	Las Vegas
Laramie River	30	7,175	5,406	26	Rio Pecos (Rio Gra. Basin.)
Rattlesnake Pass	35	7,560	6,917	30	Cañon Blanco Pass (Rio Gra. Basin.)
North Platte	54	6,695	5,000	60	Rio Grande del Norte (Rio Gra. Basin.)
Bridger's Pass	23	7,534	7,177	122	Navajo Pass (Campbell's)
Bitter Creek	97	6,315	4,998	118	Colorado Chiquito (Colorado Basin.)
Bitter Creek Summit	13	7,175	7,510	102	Leroux Summit (Colorado Basin.)
			4,748	89	Val de Chino (Colorado Basin.)
			5,241	39	Yampa Gap (Colorado Basin.)
			3,473	61	Wallapi Pass (Colorado Basin.)
Green River	20	6,092	428	49	Rio Colorado (Colorado Basin.)
Reed's Summit	75	7,567	2,579	40	Pi-Ute Pass
Bear River	30	6,045	675	36	Perry Basin (Great Basin.)
Echo Pass	18	6,879	2,100	59	Crater Pass (Great Basin.)
Great Salt Lake	127	4,290	1,900	10	Malpais Sink (Great Basin.)
Humboldt Wells	130	5,650	2,375	25	Mojave River (Great Basin.)
Humboldt Lake	283	4,047	3,080	65	East foot of Sierra Nevada (Great Basin.)
Donner Pass (crest)	123	7,042	4,008	15	Tehachapa Pass
Sacramento	105	56	700	145	Polvodero (Pacific.)
			2,100	15	Summit of Coast Range (Pacific.)
San Francisco	124	...	...	165	San Francisco (Pacific.)

CENTRAL PACIFIC OF CALIFORNIA.	SOUTHERN PACIFIC OF CALIFORNIA.
Total distance..... 1,846 miles.	Total distance..... 2,026 miles.
Between New York and San Francisco *vid* Salt Lake ..... 3,300 miles.	Between New York and San Francisco *vid* shortest and easiest route by lat. 35° ..... 3,252 miles.

explorations were conducted, be it remembered, mostly through a country inhabited by hostile Indians; every party had to be guarded whilst at work by a body of cavalry; and

every surveyor carried his firearms by his side, and his surveying instruments in his hands.

The results of these surveys are most encouraging, and prove conclusively that a railroad can be made, uniting St. Louis with San Francisco, along the 35th parallel of latitude, which shall form a shorter route between New York Harbour and San Francisco than that *viâ* Salt Lake. Not a tunnel is required throughout the entire distance; and although the ascents and descents are many, the grades are never of necessity steep. Obstruction from snow is unknown; and the Sierra Nevada, instead of requiring thirteen tunnels, and grades varying from 95 to 116 feet per mile, is crossed at an elevation of 4,008 feet without any ascent steeper than half the latter grade. The two routes can easily be compared by means of the table on the preceding page.

Each line, although usually separated from its rival by a belt of country ranging from two to six and a half degrees in width, passes across corresponding river-basins, ranges, and streams; the basin of the Rio Grande del Norte, which does not extend as far north as the Salt Lake line, being the only exception.

Eastern Kansas, Western Kansas, the valleys of the Arkansas, Purgatoire, Red River, and Rio Grande del Norte have all been described; the country along the 35th parallel, the beautiful districts about the San Francisco peaks, and the arid desert between the Rio Colorado and the Sierra Nevada have also been mentioned in detail; and the mineral wealth of New Mexico, Arizona, and California have not been altogether passed over. The conclusion I have arrived at is similar to that which Mr. Davis has stated in his report for 1855, viz., that "a much larger area of cultivatable lands, and a greater frequency and extent of forest growth, exist between

the Rio Grande and the Colorado, on the 35th parallel, than on any other latitude throughout the western territories of the United States."

Personally, I have no interest whatever in railway enterprises in America; yet, for fear of being considered unjustly partial, I almost think I have under-coloured rather than otherwise the natural resources of this tract of country; and as my friend General Palmer is quite incapable of any attempt at exaggeration in these particulars, I will give the deductions he has arrived at in his own words:—

"To sum up this subject, it may be said:—

"1st. That while the western half of the continent is not an agricultural Paradise, yet, certainly on this route, it is far from being a desert, as many have supposed. That it has been shown to be almost continuously inhabitable, and that there are frequent and extensive districts of great attraction to the farmer; while to the grazier, except in the Great Basin, it presents one vast, uninterrupted belt of uniformly superior pasturage, extending from Kansas to the Pacific Ocean, on which horses, mules, cattle, and sheep can be raised in countless herds, as cheaply, perhaps, as anywhere in the world.

"2nd. That the mildness of the climate on this parallel greatly enhances the value both of its arable and pastoral resources, enabling more than one crop to be raised in a season, permitting stock, without care, to fare as well in winter as summer, and adding the vine, cotton, and other semi-tropical fruits or products to those of our temperate latitudes. On the survey, we drove our beef cattle along in the winter season, and always found for them and for the mules of our trains abundant nutritious grazing, on the highest summits of the line equally with the deepest valleys.

"3rd. That although, for nearly the whole of this distance, irrigation is resorted to, yet, by more thorough cultivation, it is likely that, at many points, this will not be required. Besides, irrigation is not necessarily a drawback, since it enables the farmer, to a great extent, to be independent of the seasons, serves to enrich his grounds by the constant sediment with which the water is charged, and, with a properly organised plan, is not costly; while the crops are made to yield much more bountifully, as a general thing, than in the Mississippi valley. The quality of the wheat grown in these elevated valleys and dry atmosphere is most highly prized, especially for transportation.

"Lastly. That the hills and mountains over this extended range contain an amount of mineral wealth of all kinds, the useful as well as the precious, which may be considered practically inexhaustible. Furthermore, that these subterranean treasures are not confined to a few localities far apart, but have a remarkable diffusion along the route. Indeed, from the Arkansas River to the western spurs of the coast range, near San Francisco, a distance of 1,500 miles, the mountains, which are never out of sight, may almost be said to possess continuous deposits of one kind or another of valuable minerals, which, beginning with the coal and iron of Colorado, end only with the quicksilver of New Almaden.

"When it is remembered how little and how carelessly this vast territory, the home of savage Indians, has been explored by white men, and that, even in the small and old-settled district of Cornwall, where mining was carried on before the Christian era, and where the earth has been burrowed for ages at a great depth, new discoveries are still made of tin and copper lodes, we may well wonder at the amount of hidden treasures which the few disclosures already made would indicate."

CHAPTER IV.

THE NORTHERN PACIFIC RAILWAY.

It is quite impossible to weigh the advantages held out by the Northern Pacific route without becoming a convert to the scheme. By making use of the Great Lake system of the continent and the rivers which flow east and west above the meridian of New York, it would be possible to pass from that city to Portland on the Pacific, 3,205 miles, by steamboat for 2,480 miles, and by rail for the remaining 825. The object of the Northern Pacific Railroad is not only to develop the country through which it passes, but to unite the following great steamboat routes with one another:—

1st. The Great Lakes at the western end of Lake Superior.

2nd. Steam navigation on the Mississippi by a short branch to St. Paul.

3rd. Steam navigation on the Missouri at Fort Clarke and Fort Benton.

4th. The Columbian River, from the falls of which one branch is to continue onward to Portland at its mouth, another to deflect northward to Seattle, in Puget Sound. Here the advocates of this route say that they are nearly 500 miles nearer to Shanghae than at San Francisco, and that the distances to the ports of Japan, Northern China, and the Amoor are still more in their favour.

The following table gives the elevations and distances:—

THE NORTHERN PACIFIC RAILWAY.

Highest intermediate grades.		Distances in miles.	Elevations in feet.	
No high grades.	Lake Superior	...	600	Lake Superior Basin.
	Dividing Summit	32	1,158	
	Mississippi River	111	1,152	Mississippi Basin.
	Hauteur des Terres	177	1,419	
40	Red River	232	985	
...	Plateau du Coteau du Missouri	365	2,400	
40	Missouri River	485	1,800	
...	Dividing Summit	625	2,500	
40	Yellow Stone River	675	2,100	
30	Point of Judeth Mountain	936	3,495	
70	Cadott's Pass*	1,115	5,337	
70	Flathead River	1,225	2,410	Columbia River Basin.
40	Pend d'Oreille Lake	1,355	2,020	
30	Summit	1,405	2,620	
30	Spokane River	1,405	1,720	
40	Summit	1,425	2,380	
40	Columbia River	1,535	430	
...	Portland	1,755	...	
40	Columbia River	1,535	438	
50	Snoqualmie Pass	1,694	3,325	
90	Base of Mountains	1,738	175	Puget Sound.
	Seattle	1,775	...	
	Mean elevation above the sea	...	2,215	

Distance, in miles from New York, *vid* Great Lakes to Portland, 3,285 miles.
Mean annual temperature, 50° Fah.

As I have never traversed the route proposed for this railway, I extract the following quotation from the Report already referred to of the Senate Committee on Pacific Railroads, dated February 19th, 1869, as I presume no better authority could be obtained.

"There are between Lake Superior and Puget Sound and the mouth of the Columbia River 500,000 square miles of territory, upon the larger portion of which the United States' Government can impress prosperity, wealth, and power, like

* This pass is supposed to require a tunnel $2\frac{1}{2}$ miles long.

that of Illinois. It is the winter-wheat region of this continent. It is a region of alternate prairies and pine forests. It is a region rich in coal, iron, gold, silver, and copper. It is a region the salubrity of whose climate has made it the sanatarium for consumptives from the Atlantic slopes. It is a region whose Rocky Mountain section, broken down in its formation so as to be passable by loaded ponies, is blessed with a temperature so mild that countless herds of cattle range and fatten through the winter upon the natural grasses within ten miles of the summit of the continental water-parting. It is a region in all whose valleys peaches, apples, pears, plums, cherries, grapes, and sweet potatoes have rapid growth and complete maturity. It is a region so rich in grass, and so blessed in climate, that it has ever been the home, in winter as well as summer, of the buffalo, the elk, and the antelope. It has timber, water-power, and stone. It has a population of 1,410,000 people. Illinois possessed no such endowments. Her inheritance, so amazingly developed by railroads, was a garden soil, deeply underlaid with a thin seam of coal and a deposit of friable sandstone. She had nothing else. But every element of wealth, every condition of social growth and prosperity exist in superabundance and beyond exhaustion in the territory between Lake Superior and Puget Sound. For this immense region, embracing Minnesota, Dakota, Montana, Idaho, Oregon, Washington, and a part of Wisconsin, railroads can do more than they have done for Illinois."

The statement made in the above quotation as to climate may appear strange to those who are unacquainted with the great bend northward which the isothermal lines make west of the Mississippi. The winters are long and severe in Minnesota, but a little farther west, the proposed railroad enters a

much warmer region. Half-way between Chicago and the Pacific the same average temperature is found to exist in latitude 50°, more than three degrees north of the proposed line, as is experienced eight degrees farther south in Illinois and the regions east of that State. Hence the agricultural value of our Saskatchewan settlements.

The northern line will always have to contend against one great drawback, that is the closure of Lake Superior to traffic for seven out of twelve months every year. Neither this inland sea nor Lake Michigan become frozen over, but most of their harbours, and especially their shallow entrances, are always rendered impassable for from five months in the lower basin, to seven, and sometimes eight, in the upper.

Whilst we are languidly considering whether it is or is not to our advantage to unite our Pacific and Atlantic North American colonies by a national railroad across Canada, the Americans will very probably settle the question for us in a way which will not be altogether flattering to our national pride. On this subject the same Report observes:—

"The line of the North Pacific road runs for 1,500 miles near the British possessions, and, when built, will drain the agricultural products of the rich Saskatchewan and Red River districts east of the mountains, and the gold country on the Fraser, Thompson, and Kootanie rivers west of the mountains. From China (Canton) to Liverpool it is 1,500 miles nearer by the 49th parallel of latitude than by the way of San Francisco and New York. This advantage, in securing the overland trade from Asia, will not be thrown away by the English, unless it is taken away by our first building the North Pacific road, establishing mercantile agencies at Puget Sound, fixing mercantile capital there, and getting possession, on land and on the ocean, of all the machinery of the new

commerce between Asia and Europe. The opening by us first of a North Pacific railroad seals the destiny of the British possessions west of the 91st meridian. They will become so Americanised in interests and feeling that they will be in effect severed from the new Dominion, and the question of their annexation will be but a question of time."

CHAPTER V.

FUTURE PROSPECTS.

WILL the Pacific railroads pay?

The traffic receipts, and the deductions to be drawn from other considerations, lead us to believe that they will pay well; we must, however, bear in mind that facts, as well as figures, can be so represented as to prove almost anything in cases such as these, and that time alone will show what will be the fate of undertakings which have had as yet no precedents.

The Union Pacific Company thus states its earnings and expenses for the year ending June 30th, 1868, on an average length of 472 miles.

EARNINGS.

	Dollars.
Passengers	888,335
Freight	3,233,371
Express	30,955
Mails	66,800
Miscellaneous	26,579
	4,246,040

EXPENSES.

	Dollars.
Conducting transportation	517,803
Motive power	977,011
Maintenance of cars and ways	1,040,688
General expenses	149,255
	2,684,757
Balance	1,561,283
Interest on 1st Mortgage Bonds	631,680
,, Government Bonds	451,200
Surplus	478,403

But here it certainly appears that the transmission of construction material over the road has been charged to the item of freight, thus making the company itself the best customer.

The local traffic between the State of California and the interior mining towns of the Great Basin is already very great, and likely to be enormous; the manufactures and wares consumed in Oregon, Washington, Columbia, Idaho, and Nevada, are nearly all drawn thence; and so rapidly are the Pacific States and Territories increasing in population and wealth, that three railroads across the Sierra Nevada would soon have as much work as they could well take over a single line of rails. The Central Pacific Company of California is now demanding 10 cents per mile for passengers, and 15 cents per ton per mile for freight—charges which, paid in gold, are too exorbitant long to be maintained.

The year's business on the Kansas Pacific Road for 1868, over an average length of 403 miles, stands thus:—

EARNINGS.

	Dollars.
From transportation	1,910,161
From land sales	255,205
	2,165,366

EXPENSES.

Traffic, maintenance, &c.	1,036,494
Interest on 12,800,000 dollars, with Bonds at 6 per cent.	720,000
	1,756,494
Surplus	408,872

The operating expenses were equal to 54 per cent. of the gross receipts. Although the transportation of construction material may have been added in this case also, yet, as the extension of the road westward was suspended, this item must have been small. The 400 and odd miles of road opened

during these periods ended in both cases in the uninhabited wilds, and could scarcely have been expected to pay their way at all. Yet the results are most encouraging. Now that the line from San Francisco to Omaha is open throughout, we shall soon learn the solution of the problem. Experience has taught that, although the through traffic is generally most relied upon in the establishment of a line, it is the local traffic which proves in the end to be the most important. Mile for mile, the local traffic must be small throughout four-fifths of the distance between Omaha and San Francisco, unless a large business is done in the transportation of ores; yet the through traffic ought, in this exceptional case, to compensate fully for the deficiency. Fifteen hundred miles of country separate a thriving population of thirty-two millions from an equally wealthy and flourishing community inhabiting California, as well as the great producing nations of Asia—China and Japan.

Even the passenger traffic to and from the Pacific coast must be enormous, and all will probably pay at least 6 cents per mile (from 2*d.* to 3*d.*) upon the entire distance. If the central line pays, the financial success of the southern one is certain, for the local traffic will rapidly increase as the comparatively fertile districts along the route become colonised; the through traffic will at least be shared on equal terms, and probably the absence of impediments from winter snows will give the latter in the end a decided advantage. The prospects of the northern route rest upon rather different grounds, and cannot yet be fairly judged; politically, it may be very desirable that the American Government should subsidise this road also, for reasons already referred to; and one fact is certain, that, whether these undertakings are destined to pay at once, or after many years, they will

immediately be of infinite service to the Government, by settling the Indian question, by adding to the taxable wealth of the nation, and by increasing to an enormous extent the yield of precious metals.

The Bill returned this spring to Congress from the Senate Committee proposes, by its comprehensiveness, to dispose finally of the Pacific Railroad question. Its opponents call it the "Pacific Omnibus Bill," others stigmatise it as "the great railroad job." It seems, however, to an unprejudiced observer to form a part of that far-sighted policy which the Government of the United States has ever followed in relation to the development of its vast territories, and forms another convincing proof of the wonderful success obtained by railroad extension as a means of colonization.

No less than seven railway companies are recommended for subsidy in the Bill, representing a combined length of railroad exceeding 4,570 miles.

	Computed Miles.*
The Northern Pacific Railroad	1,770
The Atlantic and Pacific	640
The Little Rock and Fort Smith	160
The Kansas Pacific	400
The United States' Southern Pacific	650
The Southern Pacific of California	524
The Oregon Branch of the Central Pacific	500

These, however, only represent different sections of the three great routes which have been described. The Atlantic and Pacific, and the Little Rock and Fort Smith are to form a continuous line, uniting the railways of the Southern States with the trunk line of the 35th parallel, and to meet the Kansas Pacific at a point east of the Rio Grande in New Mexico, where both are to unite their forces in building the United States' Southern Pacific.

Again, the Southern Pacific of California is to construct

* These distances are exclusive of any sections of line already built.

the trunk line from San Francisco and to meet the above about the Colorado River.

The Northern Pacific has at present no other company to share its task. The last line is a branch from the Humboldt valley to Portland, uniting Oregon with the Central Pacific route; it does not, therefore, directly form part of any of the trans-continental routes.

One point of importance in the Bill is a change in the mode of granting the subsidy. Instead of issuing to the railway companies Government six-per-cent. bonds, varying in amount with the supposed difficulties of construction, the same system is proposed as we have adopted with our East Indian railways, viz., a Government guarantee of six per cent. upon the capital stock of each company. Very stringent measures are proposed in order to guard against the Government aid being misapplied, as well as to ensure prompt payment of the interest.

If the Bill is carried, the Pacific and Western States, as well as the Territories lying between them, will be provided with a railway system so complete in itself that the development of these enormous regions must proceed with a rapidity never before witnessed. Five years is the time named for the completion of all these railroads, and there is little doubt but that this short space is sufficient.

From two points of view, we as a nation, and, in fact, all Europe, are immediately and closely interested in all these railroad projects. In the first place, we are led to inquire whether the main currents of trade between Europe and the East—China, India, Japan, New Zealand, and Australia—will be shifted into new channels. In the second place, emigration will certainly be systematically encouraged upon so large a scale that we are likely to lose no inconsiderable

proportion of our surplus labour. If these railway enterprises are completed in five years, they will open almost as large a field for emigration as the discovery of a new continent with a circumference equal to the combined length of the railroads in question—4,644 miles; for, without highways for transportation of produce, land is comparatively valueless to the colonist.

Let us first inquire to what extent the existing currents of European traffic will be affected.

The improvements now in progress along the present lines of travel between Europe and the East must be weighed against the new routes across North America.

Trade between Europe and our Indian empire will not, of course, be affected. Our trade with China requires a little consideration. For quick passenger traffic, the completion of our railroad system across India will cause the following results :—

	Vid Marseilles and Bombay.	*Vid* New York and San Francisco.
London to Hong Kong	39 days	47 days.
Shanghae	43 ,,	43 ,,

Some of the passenger traffic to China, therefore, will certainly avoid the tropics and go by San Francisco. The passage of freight, however, is somewhat different.

The handling of goods is so expensive an item that nearly all the valuable productions of China come to us in clipper-ships round the Cape. Merchandise which can afford to pay the additional tax of a quick passage will be carried in steamers through the Suez Canal, and save a distance exceeding 4,000 miles of sea. Very little traffic goes to China by Panama; none will cross the American continent when the Suez Canal is open to navigation. If the import duties at New York were not so heavy, it is far more likely that the

Eastern States would continue to receive the silks and teas of China from us, than that the latter should come to us through them.

Passenger traffic with Japan and New Zealand will probably be diverted into the new channel:—

	Viâ Marseilles and Bombay.	*Viâ* New York and San Francisco.
London to Yokohama	48 days	38 days.

Again, the shortest route to New Zealand is *viâ* Panama; but San Francisco is 700 miles nearer New Zealand than Panama is, and already the line of steamers which did run between Panama and New Zealand has been discontinued, and a line from San Francisco established instead. We shall be able, in fact, to go from London to Wellington in thirty-seven days, thus:—

London to New York	10 days.
New York to San Francisco	6 ,,
San Francisco to Wellington	21 ,,
Total	37 ,,

Our Australian goods traffic will not be affected, and but few passengers will incur the increased expense of a long land journey by crossing North America.

CHAPTER VI.

EMIGRATION.

WHILST emigration is actually being opposed in some of our own colonies, the Americans are demanding with greater force than ever more hands and more brains.

"It can be shown by official records," says the Report before mentioned, "that the Kansas Pacific, the Union Pacific, and the Central Pacific have been instrumental in adding hundreds of thousands to the population of the States of Kansas, Colorado, Iowa, Nebraska, California, and Nevada. Minnesota owes to the rapidity and cheapness of transportation by rail her best immigrants—over 100,000 Germans, Norwegians, and Swedes. Every foreign labourer landing on our shores is economically valued at 1,500 dollars. He rarely comes empty-handed. The Superintendent of the Castle Garden (New York) Emigration Depôt has stated that a careful inquiry gave an average of 100 dollars, almost entirely in coin, as the money property of each man, woman, and child landed at New York. From 1830, the commencement of our railway building, to 1860, the number of foreign emigrants was 4,787,924. At that ratio of coin-wealth possessed by each, the total addition to the stock of money in the United States made by this increase to its population was 478,792,400 dollars. Well might Dr. Engel, the Prussian statistician, say—'Estimated in money, the Prussian State has lost, during sixteen years, by emigrants, a sum of more than

180,000,000 thalers. It must be added that those who are resolved to try their strength abroad are by no means our weakest elements. Their continuous stream may be compared to a well-equipped army, which, leaving the country annually, is lost to it for ever. A ship loaded with emigrants is often looked upon as an object of compassion. It is, nevertheless, in a politico-economical point of view, generally more valuable than the richest cargo of gold dust.'

"The Kansas Pacific Railway Company has organised immigration to its lands. It has agents in Europe who tell of the resources of Kansas, and induce people to seek a home there; aiding them, if necessary, to cross the Atlantic and to reach that State by rail, and selling them lands on long credit. This liberal and wise example will be followed. Let the Northern and Southern Pacific railroads and the Homestead-law go together across the Continent; and in less than ten years we shall see upon the lines of those roads and their outlets at least three millions of the best population of Northern Europe—farmers, graziers, mechanics, and miners. Reckon up their worth at 1,500 dollars a head; add to the product the quantity of coin they will bring, 100 dollars each person; then say if, in 4,800,000,000 dollars added to the wealth of the country, our Government cannot find authority and courage to guarantee the interest of the bonds issued to assist in building the roads."

Although the Prussian statistician mourns over the loss of his emigrating countrymen, we in England are not justified in joining him in his regrets. The long-continued misunderstanding between capital and labour which exists in this country has done much to assist other European nations in raising their manufactories to a level with our own. We are no longer the workshop of the world. We have more cotton-

mills, more machinery, more iron-works, and more operatives than are required to supply the markets dependent upon us. We require depletion. The abject poverty which now stares us in the face is becoming unendurable. How can our destitute artisans educate their children when they are clothed with rags?—or what do starving parents care for school reform? Equilibrium between the demand and supply o labour must be attained; and wholesale emigration is the only means by which this can be accomplished.

The fact of the United States being a foreign country ought not to affect the question in the least. Canada, Australia, New Zealand, all or any one of our colonies may soon become independent of the mother country; and perhaps it is better for both that they should before long dissolve partnership. It is, however, our desire, and also greatly to our advantage, to remain on the best terms with our American neighbours. With one section of them—the emigrant Irish—this is at present impossible. They hate us so intensely that, were it possible for them to gain the ascendency, war would surely follow. It should therefore be our aim to maintain the ascendency of the Saxon and Teutonic elements in States.

The Americans complain of our gross ignorance as regards their politics, institutions, and social life; and although they are probably right in this accusation, our ignorance of them certainly finds a counterpart in their ignorance of us. If the North was not unanimous in its views as to the desirability of carrying on war with the South, how could they expect us all to be of one mind? Yet most Northerners believe that we sided altogether with the South, and they look upon us as enemies in consequence. Again, if they had carefully watched the state of public opinion here since the war, they would have perceived that if parties in England were pretty

evenly balanced in private sentiment with respect to the struggle when it was in progress, the direction which public opinion has since been taking is towards the Republican party and the policy of the North.

This drifting of the majority of Englishmen towards acquiescence in the unity and prosperity of the States will receive a severe check if the American Government perseveres in its most unjust treatment of the Alabama question; for it will convert many to the opinion that perhaps, after all, we should have done ourselves and the world generally a great service by assisting in the partition of the Union instead of remaining strictly neutral in the quarrel. If the Americans insist upon keeping up ill-feeling by refusing to settle amicably these outstanding claims; if they continue to make mountains of molehills, and think it worth while to risk a war, which would be thrice as expensive as that which they have just waged, for the sake of gratifying a vague feeling of jealousy which has no real foundation, they will receive from us but very few emigrants and very little capital.

So much has been said and written, even within the last few months, on emigration, that I will not attempt to discuss the subject in detail; but I have, in conclusion, one simple scheme to propose, which I consider eminently practical, and which is the result of much reflection and of some experience.

A would-be emigrant generally finds it almost impossible to obtain reliable information; he knows nothing, as a rule, of distant lands; and those, unfortunately, to which he proposes himself to go, lie far away on the outskirts of civilisation, and quite beyond the beaten track of ordinary travel. He knows nothing of the expense, nothing of the requirements, nothing of the chances of success or failure, and it often happens that when he has reached the country of his

adoption he goes to ruin before he has had time to learn how to live there. A wise man, on emigrating, generally asks himself this question—"How can I support life, and keep the little capital I have (supposing he is not quite destitute) until I learn how the land lies?" Thousands stop at home in misery and want because they cannot answer this question, and dare not take this first step in the dark. Suppose there were established in London, in connection, say, with a central committee on emigration, a newspaper (call it *The Emigrant*) devoted to the subject, and an office to which all who desired could apply, we should be able in time to supply much of the information required.

The editor of *The Emigrant* would be able to assist all parties, first by publishing, under authority, so to speak, reliable information of every kind bearing upon the subject, and, secondly, by bringing interested parties—shippers, agents for land and railway companies, colonial and other Government agents, landowners, and the rest—face to face, through the advertising columns, with those who need lands and conveyance to them.

One indispensable point would have to be *reliability of information.* We must have no more British Columbia lies, such as were palmed upon us a few years ago by a "large-print" correspondent in a daily paper. Better lack of information than false statements. The advertisements should be quite distinct from the editorial part of the paper, and those which were evidently false should be omitted.

The office should be an inquiry office, and might be conducted on the general plan of our registry offices for servants. It might be made almost self-supporting by demanding a small charge for services rendered. A library and reading-room would form an indispensable branch of the establish-

ment, where colonial and other papers would be received and filed, and where books bearing on the subject, bills of sailing, fares for transportation, &c., could be found. Such kind of information would naturally gravitate thither; and if such a system were once in active operation, it could be extended indefinitely, and agencies might be planted in the countries demanding immigration, as well as in those suffering from over-population; each would work in its several capacities, the one to obtain information, the other to impart it—the one to pave the road, the other to show the way.

Employers of skilled labour would no doubt often find it advantageous to import fresh hands through this channel; they could communicate directly with the central office, and would no doubt obtain the assistance they needed.

Stock-raisers, vine cultivators, agriculturists, masons, &c., could apply also for aid, and would be able to select, within certain limits, those regions in which their particular knowledge would be of practical value. All, however, would soon learn that success as a colonist depends chiefly upon the art of readily adapting oneself to whatever kind of labour is most in demand, whether it be, as my friend at Albuquerque proved by his actions, killing sheep, editing a newspaper, or both combined.

It is unnecessary to do more than roughly sketch the scheme, for there is no difficulty in filling in the details. Such an institution should not savour of a charity; it should not patronise, but assist the emigrant; and his advancement, irrespectively of nation or politics, religion or caste, should be the sole object to be attained.

There is no lack in this country of philanthropists whose great and lifelong desire is to do good to their fellow-men. Here, then, is an opportunity for those who have time and

money at their command, and who look for their reward, not in the homage paid them here, but in the inward consciousness that they have done some service to suffering humanity.

If our great landowners, our merchants, and especially our manufacturers, do not further this great end; if we, as a nation, persist in keeping down labour by feeding millions of unproductive paupers at home, instead of helping them to find employment elsewhere, we shall richly deserve to be overpowered by that rabble form of democracy which aristocratic England dreads so much.

APPENDICES.

APPENDIX A.

BOTANY OF THE REGION ALONG THE ROUTE OF THE KANSAS PACIFIC RAILWAY, THROUGH KANSAS, COLORADO, NEW MEXICO, ARIZONA, AND CALIFORNIA.

By C. C. PARRY, M.D., Botanist to the Survey.

The native vegetation, which is the most prominent external feature that first attracts the eye of the observing traveller in a new country, is found, on a more careful examination, to afford the most direct means of arriving at those peculiarities of soil and climate that indicate its capacity for agricultural productiveness, as well as its adaptation for desirable civilised habitation. Hence lists of plants, especially in regions that have not been subjected to long experience or modification in the pursuits of agriculture, are valuable as indicating the particular class of vegetable products to which they are best adapted, or whether they are fit or unfit to reward human industry by profitable returns.

The unguarded and loose use of the term "desert," as employed, not only in popular writings, but also in scientific descriptions, has given origin to wrong impressions in reference to a large portion of our Western territories, that hold with remarkable persistence both on the popular and scientific mind. Thus, although to a certain extent the desert wastes of our old geographies are contracted, or pushed farther west into unexplored districts, the prevalent idea remains, that much of the continental regions beyond the 100° of west longitude is unproductive and unfitted for human habitation.

The readiest means of correcting this wrong impression would be to exhibit the plants which naturally grow on these supposed desert wastes; or, to one somewhat versed in the nomenclature of botany, a list of the native plants of such a district would serve at once to dispel this old and cherished illusion. Thus, let the intelligent traveller pass through Eastern Kansas in the month of September, and note the gigantic weeds and sunflowers that all but obstruct his view along the beaten road, and it will not be difficult to convince him that, where such rank annual vegetation can secure nourishment, there corn and other useful agricultural products can be raised in perfection. Or, on the great plains beyond, let him see the broad uplands bedded with nutritious grasses, and he will not be slow in arriving at the conclusion that, if only partially adapted to agriculture, it certainly possesses great pastoral capacities.

Still farther west, where mountain slopes bound rich alluvial valleys, well

watered, and displaying a luxuriant vegetation, similar in many of its aspects to what he has been accustomed to in cultivated eastern countries, he will have no hesitation in assuming that, with ordinary facilities for working the soil, still greater returns will reward his toil from the virgin sod unexhausted by protracted culture. Again, where natural forests abound, there we may reasonably expect to find all the conditions of successful tree or fruit culture; and even where many of these indications are wanting, a soil rich in mineral ingredients for the growth of plants, but exposed to the intense aridity of a rainless sky, may be restored to fertility by processes of artificial irrigation.

Thus, according to past experience, the real danger to be guarded against in estimating the productive capacity of an undeveloped country is an undue depreciation of its real value, and where definite knowledge of natural products is substituted for easy ignorance, the deserts disappear from our geographic horizon.

The list of plants herewith presented is a contribution, from one of the latest and most complete railroad surveys ever conducted on this continent, to our knowledge of the natural vegetation of the Far West. Without aiming to be complete, it is at least sufficient to show that, along the entire length of the railroad survey, extending from Kansas through South-Eastern Colorado, New Mexico, and Arizona, to the Pacific, there is an extent of habitable country, which only needs to be made easily accessible from the populous districts of the Mississippi valley and the Western seaboard, to support and maintain a prosperous and civilised population.

Commencing with Eastern Kansas, we note the rank vegetation pertaining to rich alluvial districts: the bottom-lands are occupied with a heavy growth of forest trees, including elm, black walnut, hackberry, ash, and cotton-wood; the uplands support rank prairie grasses and a variety of plants, exhibiting a strange mingling of north-western, and more southern, forms, corresponding to the peculiar mixed climate which characterises this section. Proceeding westward, a gradually increasing atmospheric aridity is evidenced by a corresponding disappearance of forest growth, which is confined to the moist margins of constant streams or water-courses, dry during the summer season, and is represented only by the persistent cotton-wood, box-elder, and willow. On the uplands, *buffalo grass* and *grama* take the place of the rank prairie sod, and are characterised by a short curly growth, and dense fibrous roots, often growing in clumps, and penetrating deeply into the dry though still nutritious soil.

Still farther west we find the depressed basins and valleys exhibiting a white saline efflorescence, due to the intense evaporation, which in the dry season concentrates the saline ingredients derived from the washed soil of the uplands on the saturated bottoms, overflowed in the season of rains. With this peculiar condition of things we meet with a class of saline plants, many of them identical with such as are found along the sea-shore, or in connection with salt marshes. Here the uplands acquire more distinctly an arid feature, to which, however, the term of desert cannot be properly applied, as, although in great measure unfit for ordinary agriculture, they still support a close growth of peculiar grasses, which in the summer rainy season assume a dull verdure, and in the succeeding dry season become converted into a nutritious hay, the saccharine and organised juices being concentrated in the dried perennial stem and leaves.

On the upper alluvial benches of the principal valleys we encounter dense

nourish growths of "wild sage" (*Artemisia*), *Sarcobatis*, and *Obione*, or grease-wood, well known to all Western explorers.

The conditions essential for timber growth, viz., superficial moisture, and shelter from fierce winds, are here confined to the deeper valleys and constant large water-courses, where cotton-wood and willow maintain a variable existence, occasionally occurring in extensive tracts along the Arkansas and the Republican Fork, while elsewhere the country presents a treeless and open waste.

The idea frequently suggested by those unacquainted with the true physical features of this section of country, of planting trees, and thus securing shelter and an increased precipitation of moisture, will by no means stand the test of a common-sense view, where the objects to be gained are precisely such as the country does not naturally admit of; and furthermore, its perfect adaptation to grazing is so manifest, that any other view of its application to useful production is not even to be desired.

Before arriving at that point of extreme aridity which a continuous open and level country would no doubt eventually reach, deserving the name of a true desert (and which is actually realised farther south in the staked plains of Texas), we encounter the abrupt elevation presented by the Rocky Mountain range, with its steep broken slopes and irregular rocky spurs. This at once changes the whole aspect of the scenery; its elevated ridges and snow-clad peaks presenting a cool condensing surface, on which the warm moist currents of air are deposited in the form of summer rains and winter snows. These necessarily give rise to perennial streams and springs, which send their watery tributes to the arid plains below, and maintain verdure in the lower valleys, which are thus adapted to cultivation by processes of irrigation.

This obvious change from increasing aridity to sufficient moisture is at once characterised by a great profusion of vegetation, including trees, shrubbery, and a variety of plants, either identical or similar to such as are met with in well-watered mountain districts to the east.

Where a sufficient elevation is attained to insure a constantly cool atmosphere, forests abound, consisting mainly of evergreen pines, spruce, and fir, but also including a scattered growth of scrubby oak, maple, birch, cotton-wood, and willow. The principal valleys that penetrate this mountain district, including the Arkansas, with its numerous branches, as the Huerfano, Purgatoire, and Greenhorn, comprise sections of great natural fertility, abundantly watered, and conveniently located for supplying adjoining mining districts with their surplus agricultural products. Hence they represent the main populous districts, which, combining all the agreeable accessories of a fine salubrious climate, and conveniences for building and fuel, will invite and retain a permanent population devoted to the mixed pursuits of agriculture and grazing.

In the accompanying list of plants, those referred to as occurring in the valley of the Huerfano and Sangre de Christo will serve to represent the natural vegetation of this peculiar mountain district.

In passing down into the valley of the Upper Rio Grande, we encounter a flora very distinct in its general features, including a number of peculiar plants and strange shrubbery, having a Mexican type. The river, here hemmed in along a great portion of its upper course by dark, igneous, and basaltic rocks, flows in deep inaccessible cañons, which open out below into wide sandy basins.

The San Luis valley, lying above this cañoned portion of the valley, presents a wide alluvial basin, including extensive tracts of fertile soil, lying along the course of the numerous tributary streams flowing down from the high mountain ridges on either side of the main valley.

This section is particularly adapted to the growth of cereals and root crops, and in its cool atmosphere abundance of grass and clear flowing water is eminently a dairy region.

In these respects, the two portions of the main valley, designated by the Mexican population as the Upper and Lower River, maintain the natural distinction in their products, the former being adapted to small grains, potatoes, butter, and cheese, the latter to maize and fruits. In this condition of things, an exchange of products would prove of mutual advantage, and afford profitable business in the way of transportation in both directions.

The natural supply of fuel for all this region is furnished in the extensive forests of *piñon* and *cedar*, which occupy adjoining rocky and barren ridges, while the higher mountain ranges will supply lumber and building material to any desired extent.

The lower portion of the valley of the Rio Grande includes the district generally referred to as New Mexico. Here we find the valley spread out into wide alluvial or sandy bottoms, bounded by bluffs of gravel and occasional rocky declivities, capped with basalt. The flora here includes the plants referred to in the accompanying list as New Mexican. Owing to the more porous nature of the soil, and the greater summer heat, the general aspect of vegetation is characterised as arid. There is a scarcity of tree growth, confined to the cotton-wood and willow, which occupy the moist bottoms or direct margins of the river. The grass of the valley is coarse, and frequently saline, and on the adjoining uplands it is scant, though of a nutritious quality. The low bottom-lands susceptible of irrigation are well adapted to the growth of maize, vines, and peaches, being subject to irregular overflows, which, when moderate in extent, and occurring at the proper season, help to maintain the natural fertility of the soil, but are occasionally very destructive in flooding growing crops, or undermining and transporting large tracts of fertile soil, leaving in its place the coarse sandy layers of the changeable river-bed. At other points of the valley the prevalent westerly winds gather up the light drifting sands of the adjoining bluffs, and deposit them in changeable ripple-marked dunes on the fertile bottoms, thus consigning them to a hopeless sterility, as well as obstructing the ordinary roads by their deep sandy beds. Still farther south, in the neighbourhood of Socorro, sub-tropical shrubs, including *Acacia*, *Mezquit*, and *Larrea*, make their appearance, marking the northern limits of the Mexican flora.

On the uplands west of the Rio Grande, near the 35° parallel, west longitude, we meet with a great variety of surface exposures. These are exhibited in extensive *mesas*, or table-lands, composed of light-coloured, porous, sedimentary rocks, bounding, with abrupt mural faces, valleys of erosion; these strata are interrupted at various points by igneous protrusions and overflows of basalt and lava, serving to diversify in a remarkable manner the external features of the scenery, and to modify the texture and composition of the overlying soil. This is especially noticeable in the character of the native vegetation, which is directly adapted to these variable conditions. Thus, on the dry uplands and mesas, we find a scattered growth of *grama*, interrupted with occasional growths of *cedar* and *piñon*. On the more elevated mountain ridges we meet with dense

forests of Rocky Mountain pines, spruce, and fir, intermingled in favourable localities with oak and aspen. The lower valleys adapted to agriculture support a growth of coarse grass and shrubbery, interrupted by occasional bare saline flats. In certain sections of this district deep *cañoned* valleys conceal from view clear running streams, in which the vegetation is rank and luxuriant, while at other points the valleys expand into wide grassy basins, where, during the dry season, running water disappears from the surface, or is exhibited only in brackish springs. This character of country comprises the favourite home of the roving Navajo and Apache, and in certain defensive positions, has been occupied since the earliest historic periods by the industrious and contented Pueblo Indians. It extends, with slight variations, through Western New Mexico and Northern Arizona, the surveyed railroad route on the 35° parallel traversing the most desirable portions. Being passed over by the surveying parties during the fall and winter months, only an imperfect view of its botanical features could be obtained, but the faded vestiges of floral beauty were manifest on every hand to testify to the luxuriant richness of its summer dress.

The uplands of the valley of the Colorado, and the desert beyond, extending to the foot of the Sierra Nevada, comprise a singular and very interesting flora, the general features of which, though not thoroughly examined, are still fairly represented in scientific collections. Here arborescent *Cacti* and *tree yuccas* form a conspicuous feature in the landscape, whilst the true desert flora, such as the neat evergreen *Larrea* with its myrtle-shaped leaves, together with a host of thorny *Mimoscæ*, dull-coloured *Obione*, or grease-wood, and prevalent *Artemisias*, all serve to give a faded aspect to the vegetation.

The annual growth is here exceedingly rapid and evanescent, and consists mainly of delicate grasses and tender-foliaged plants, which expand quickly with the early spring rains, and disappear as suddenly when the scorching sun licks up the superficial moisture, leaving no trace of their previous existence, save the diminutive seeds buried from sight in the light drifting sand or gravelly soil. In the dry water-courses of this district we meet constantly the *Cercidium floridum*, or "green-barked Acacia," the arborescent Dalea (*Dalea spinosa*), with its silvery leafless branches, and the valuable "iron-wood" (*Olneya Tesota*).

The *Chilopsis linearis*, allied to *Catalpa*, is also abundant, being known under the common name of the "desert willow," its long slender branches being used by the Indians for basket-work. In the river bottoms we meet with luxuriant growths of *mezquit* and "screw-bean," the former furnishing a very durable wood, affording excellent fuel, occasionally of sufficient size for railroad ties; the *screw-bean* is the principal reliance for feeding mules and cattle, as a substitute for grain.

Most of the plants of this district, including especially the *Artemisias* and other shrubby *Compositæ*, are smeared with a resinous varnish, which gives out a pleasant stimulating aroma, noticed by nearly all desert travellers. It is quite probable that some of these plants possess valuable medicinal qualities, or are adapted for dyes or varnishes, presenting a subject well worthy of investigation.

In reaching the Pacific slope of the Californian mountains, the rich vegetation of this district is brought forcibly to view in contrast with the desert forms before noticed. In the moist humid soil of the mountain valleys we here meet with those gigantic monsters of the forest found nowhere else.

Broad-spreading oaks, both evergreen and deciduous, nourish in their leafy shade delicate plants and vigorous shrubbery, while the open valleys and hilly slopes present a patchwork of flowers rivalling the colours of the rainbow. This rich botanical field, which has already given many choice plants to enrich Eastern gardens, is not yet exhausted, and new discoveries are being made every year by the zealous botanists connected with the California State Geological Survey. A regular flora of this region is now in course of preparation by Professor W. H. Brewer, under the able assistance of Professor Gray, of Cambridge, Massachusetts.

THE FOREST TREES ON THE ROUTE OF THE SURVEY.

The importance of the tree product near the line of the surveyed railroad route, both as regards supplies of fuel and purposes of construction and repairs, is of sufficient interest to receive some special notice in a general botanical report.

After leaving the wooded district of Eastern Kansas, which occupies the principal valleys with belts of timber of variable extent, and which diminishes rapidly to the west, we at length, near the 100° west longitude, enter upon a treeless district, extending for over 5°, and reaching to the foot of the Rocky Mountains. Here, with an increase of elevation and condensation of moisture, we encounter the pine forests of Eastern Colorado. A very remarkable outlier of this pine growth occupies an elevated district south-east of Denver, which, not properly pertaining to the Rocky Mountain range, in the absence of granite or metamorphic rocks, is comparatively smooth in its general outline, and easily accessible. The forest growth is here almost exclusively confined to the Rocky Mountain yellow pine (*Pinus ponderosa*), which, from its durable quality, regularity of growth, and facility for working up into the different qualities of lumber, is probably the most valuable of any Western pine. When growing singly, this pine is apt to assume a branching shape, with an irregular oval outline, but in extensive forests it presents a more uniform trunk, less knotty, and better suited for boards and dimension lumber. The interior wood, being to a considerable extent impregnated with resin, is thus rendered durable, and well adapted for railroad ties. This is the prevalent pine tree which is met with on all the elevated mountain slopes extending from the Eastern Rocky Mountains to the Sierra Nevada.

Farther to the south of the Denver pine-region, along the different lines of the surveyed railroad route through Southern Colorado and New Mexico, a very different and peculiar pine makes its appearance along the foot-hills of the Rocky Mountains, clothing the low rocky ledges with patches of dark green, as seen in a distant view.

This is the nut-pine, or *Piñon* of the natives, *Pinus edulis* of botanists. It is generally of a low branching habit, its short stocky trunk dividing near the surface of the ground into branching arms, giving it a globular outline. When growing in large bodies, its straggling branches intertwine to form almost inextricable thickets.

It is generally associated at lower elevations with a cedar (*Juniperus occidentalis*) of a similarly straggling habit, which farther west gives place to the Arizona juniper (*Juniperus pachyphlœa*, Torr.)

These trees are all well adapted for fuel, burning when dry with a clear intense flame, which is prolonged and steady, especially suited for steam

purposes. In some sections the *piñon* presents a more upright growth, and has short uniform trunks, suitable for railroad ties. The wood is durable, but knotty, and with a twisted fibre, so that it is unfit for other purposes of railroad construction.

The distribution of the piñon and cedar forests is particularly favourable for convenient supplies of railroad fuel, being scattered along the line of the route, easily accessible, and in inexhaustible amount, the range extending through New Mexico, Northern Arizona, and to the eastern base of the Sierra Nevada in California.

On the higher crests of the Rocky Mountains, the Sierra Madre, San Francisco, and the Sierra Nevada we meet with other varieties of pine and spruce, occasionally forming extensive forests, and affording material for the various uses to which different tree products are adapted. Of these we may specify the *Piño real* (*Pinus contorta*), which is noted for its slim, regular growth, particularly suited for telegraph poles and cross ties; the Douglas spruce, or mountain hemlock, affording a very durable and tough wood; Menzies' spruce, and *Abies Engelmanni*, the latter furnishing a light, soft wood, well adapted to inside work. Besides these, on the high alpine ridges, we meet with *Pinus flexilis* and *Pinus aristata*, which extend to the extreme limits of tree growth on the Rocky Mountains and the Sierra Nevada.

It will be noticed that scarcely any mention has been made of hard wood, as oak, ash, or walnut, in the central mountain region. While we have representatives of each of these, they are so comparatively rare, or of such insignificant growth, as not properly to enter into the account in any economical view of our central mountain forests. In certain sections of the Rocky Mountains, and the lower valleys of the San Francisco Mountains, we meet with a deciduous-leaved white oak, sometimes of fair size, and suitable for railroad timber, but generally of scrubby growth, and not fit for any useful purposes of construction. The same is true of the occasional scattered growths of walnut and ash, which are rarely of sufficient size or quantity to attract attention.

But on reaching the Sierra Nevada range in California, we meet not only with a great variety of peculiar pines and firs, but also large oaks, forming extensive forests, and well adapted to all the required uses of hard wood in Eastern countries. Of those deserving special notice is the white oak (*Quercus lobata*) found along the eastern tributaries of the Tulare valley, a perfect giant of vegetable growth, which covers extensive tracts of country. Besides this, there are several varieties of live-oak, occupying the interior and coast ranges, which, though not generally durable, and of a stocky growth, are no doubt applicable to a variety of useful purposes.

Then we have the red-wood forests of the coast range, the timber of which is highly prized for its durability and facility for working.

The peculiar qualities and distribution of the Californian forests would require a long special report to do justice to the subject, and will no doubt eventually receive attention when the railroad interests of that section demand more thorough investigation. For other items of information in regard to the botany of the region connected with the railroad survey, reference may be had to the following list of plants.

LIST OF PLANTS COLLECTED OR OBSERVED ON THE SURVEY OF THE KANSAS PACIFIC RAILWAY, IN 1867 AND 1868.

(*The numbers refer to the author's collection in the Botanical Department of the British Museum.*)

		RANUNCULACEÆ.	
	Clematis Douglasii	Hook	Valley of the Huerfano
	Aquilegia cærulea	Torr.	,, ,,
	Delphinium scopulorum	Gray	Sangre de Christo Pass
141	D. azureum	Michx.	Raton Mountains
		PAPAVERACEÆ.	
143	Argemone hispida	Gray	Kansas
144	A. Mexicana	Linn.	New Mexico
		CRUCIFEREÆ.	
145	Pachypodium integrifolium	Nutt.	Valley of the Huerfano
152	Erysimum Arkansanum	Nutt.	Colorado
153	E. pumilum	Nutt.	Sangre de Christo Pass
153	E. asperum	De C.	Colorado and New Mexico
146	Stanleya pinnatifida	Nutt.	Upper Arkansas River
	Draba streptocarpa	Gray	Sangre de Christo Pass
	Lepidium alyssoides	Gray	Fort Garland
	L. flavum	Gray	Colorado Desert, Feb., 1868
148	Streptanthus linearifolius	Gray	New Mexico
150	Sisymbrium incisum	Engel.	,,
		CAPPARIDACEÆ.	
147	Cleome integrifolia	Torr. and Gray	Colorado and New Mexico
94	Polanisia uniglandulosa	De C.	Raton Mountains
149	P. graveolens	Raf.	,,
		VIOLACEÆ.	
	Ionidium lineare	Torr.	Kansas
		IRIDACEÆ.	
34	Sisyrinchium Bermudiana	Linn.	Purgatoire Valley
		HYPERICACEÆ.	
	Hypericum Scouleri	Hook.	Sangre de Christo Pass
	Canotea holocantha	Torr.	Arizona
		CARYOPHYLLACEÆ.	
	Silene acaulis	Linn.	Sierra Blanca
	Paronychia pulvinata	Gray	,,
	P. sessiliflora	Nutt.	Northern New Mexico
	Sagina Linnæ	Presl.	,, ,,
	Arenaria stricta	Michx.	Kansas
151	A. Fendleri	Gray	Sangre de Christo Pass
	A. arctica	Steven.	Sierra Blanca

		MALVACEÆ.	
179	Callirhoe involucrata	Nutt.	Kansas
181	C. macrorhiza	Gray	,,
	Sidalcea candida	Gray	Valley of the Huerfano
	S. malvæflora	Gray	,, ,,
	Sphæralcea incana	Torr.	Upper Arkansas
	S. Emoryi	Gray	Colorado Desert
	Malvastrum exile	Gray	,,
182	M. coccineum	Gray	Purgatoire Valley
		LINACEÆ.	
95	Linum rigidum	Pursh.	Smoky Hill, Kansas
184	L. perenne	Linn.	,,
		RUTACEÆ.	
	Thamnosma montanum	Gray	Colorado Desert
		COMMELYNACEÆ.	
35	Commelyna Virginica	Gray	Raton Mountains
36	Tradescantia Virginica	Linn.	,,
		ZYGOPHYLLACEÆ.	
	Larrea Mexicana	Moric.	New Mexico and Arizona
		RHAMNACEÆ.	
	Ceanothus Fendleri	Gray	Northern New Mexico
		ACERACEÆ.	
	Acer glabrum	Torr.	Sangre de Christo Pass
189	Negundo aceroides	Moench.	Kansas
		POLYGALACEÆ.	
86	Polygala alba	Nutt.	Kansas
		LEGUMINOSÆ.	
88	Lupinus pusillus	Pursh.	Smoky Hill, Kansas
87	L. decumbens	Torr.	New Mexico
	Trifolium involucratum	Willd.	Sangre de Christo Pass
	T. nanum	Torr.	Sierra Blanca
	Psoralea esculenta	Pursh.	Smoky Hill, Kansas
92	P. argyrophylla	Pursh.	,,
93	P. campestris	Nutt.	Purgatoire Valley
96	P. cuspidata	Pursh.	Smoky Hill, Kansas
91	P. floribunda	Nutt.	Purgatoire Valley
89	P. lanceolata	Pursh.	Smoky Hill, Kansas
90	P. digitata	Nutt.	Purgatoire Valley
	P. floribunda	Nutt.	Smoky Hill, Kansas
121	Desmanthus virgatus?	Says Gray	Raton Mountains
100	Dalea nana	Torr.	Upper Arkansas
99	D. luxiflora	Pursh.	New Mexico
	D. mollis	Torr. and Gray	Colorado River
	D. spinosa	Gray	,,
	D. Emoryi	Gray	,,
	D. Parryi	Torr. and Gray	,,
97	Amorpha fruticosa	Linn.	New Mexico
98	A. canescens	Nutt.	,,
	Parryella filifolia	Torr. and Gray	Rio Grande and New Mexico

LEGUMINOSÆ (*continued*).

	Robinia Neo-Mexicana	Gray	Valley of the Huerfano
	Algarobia glandulosa	Torr. and Gray	New Mexico
116	Sophora sericea ?	Nutt.	,,
	Strombocarpa pubescens	Gray	New Mexico and Rio Colorado
119	Cassia Rœmeriana	Scheele	Raton Mountains
	Schrankia uncinata	Willd.	Smoky Hill, Kansas
104	Glycyrrhiza lepidota	Nutt.	Kansas and New Mexico
	Astragalus carycocarpus	Pursh.	Smoky Hill, Kansas
105	A. pectinacea	Gray	New Mexico
107	A. Missouriensis	Nutt.	Smoky Hill, Kansas
106	A. cyaneus	Gray	New Mexico
	A. Plattensis	Nutt.	Smoky Hill, Kansas
113	A. lotiflorus	Hook.	,,
112	A. mollissimus	Torr.	,,
138	A. microlobus	Gray	,,
110	A. gracilis	Nutt.	,,
	A. adsurgens	Pall.	Sangre de Christo Pass
	A. diphysus	Gray	Northern New Mexico
	A. lonchocarpus	Gray	Valley of the Huerfano
111	A. racemosus	Pursh.	Kansas
	A. hypoglottis	Linn.	Valley of the Huerfano
	A. flexuosus	Dougl.	,, ,,
	A. pectinatus	Dougl.	Kansas
	A. Nuttalianus	Gray	New Mexico
	A. glabriusculus	Gray	Sangre de Christo Pass
	A. Fendleri	Gray	New Mexico
	A. decumbens	Gray	,,
	Oxytropus Uralenesis	Linn.	Sangre de Christo Pass
	O. splendens	Dougl.	,, ,,
	O. deflexa	De C.	,, ,,
114	O. Lamberti	Pursh.	Kansas
	Hedysarum Mackenzii	Richards	Valley of the Huerfano
	H. canescens	Nutt.	,, ,,
115	Baptisia australis	R. Br.	Kansas
118	Hoffmanseggia Jamesii	Torr. and Gray	Upper Arkansas
	H. drepanocarpa	Gray	New Mexico
117	H. Drummondii	Gray	,,
	Cercidium floridum	Benth.	Arizona
	Olneya Tesota	Gray	Southern Arizona
101	Petalostemon candidum	Michx.	New Mexico
102	P. violaceum	Michx.	,,
103	P. macrostachyon	Torr.	,,

ROSACEÆ.

	Prunus pumila	Linn.	Kansas
	Sorbus Americanus	Willd.	Greenhorn Mountain
	Cercocarpus parvifolius	Nutt.	New Mexico
120	Fallugia paradoxa	Torr.	,,
	Dyas octopetala	Linn.	Sierra Blanca
	Cowania Mexicana	Dougl.	Arizona
125	Rubus ——— ?		New Mexico
	R. deliciosus	Torr.	,,
	R. strigosus	Michx.	Sangre de Christo Pass
	Fragaria Virginiana	Eurhart	,, ,,
	F. vesca	Linn.	,, ,,
123	Potentilla Pennsylvanica	Linn.	New Mexico
122	P. rivularia ?	Nutt. (Gray says not)	,,
	P. diversifolia	Lehm.	Sangre de Christo
124	P. hispidula?	Torr. and Gray	New Mexico

	SAXIFRAGACEÆ.		
	Ribes hirtellum	Michx.	Valley of the Huerfano
	Parnassia parviflora	De C.	Upper Huerfano
	Saxifraga punctata	Linn.	Sangre de Christo
	S. cæspitosa	Linn.	,,
	S. bronchialis	Linn.	,,
	CRASSULACEÆ.		
	Sedum Rhodiola	De C.	Sangre de Christo
	ONAGRACEÆ.		
130	Epilobium paniculatum	Nutt.	New Mexico
126	E. coloratum	Muhl.	,,
131	Stenosyphon virgatus	Spach.	Kansas
128	Gaura coccinea	Nutt.	,,
129	G. parviflora	Dougl.	New Mexico
139	Œnothera lavendulæfolia	Torr. and Gray	Kansas
211	Œ. triloba	Nutt.	New Mexico
136	Œ. pinnatifida	Nutt.	Kansas
	Œ. Missouriensis	Sims	,,
140	Œ. serrulata	Nutt.	Purgatoire Valley
134	Œ. coronopifolia	Torr. and Gray	Upper Arkansas
132	Œ. canescens	Torr.	Purgatoire Valley
133	Œ. biennis	Linn.	,,
137	Œ. albicaulis	Nutt.	,,
138	Œ. speciosa	Nutt.	,,
	LOASACEÆ.		
	Mentzelia multiflora	Nutt.	Valley of the Huerfano
	M. (Eucnide) urens	Parry	Colorado Valley
191	M. ornata	Torr.	New Mexico
192	M. Wrightii	Gray	,,
193	M. nuda	Torr. and Gray	,,
	CACTACEÆ.		
	Opuntia arborescens	Engel.	New Mexico
	O. Bigelovii	Engel.	Colorado Desert
	O. Davisii	Engel. and Big.	Western New Mexico
	O. Emoryi	Engel.	,, ,,
	O. tessellata	Engel.	Colorado Desert
	O. frutescens	Engel.	New Mexico
	Echinocactus Simpsonii	Engel.	Sangre de Christo
	E. Wislizeni	Engel.	New Mexico
	Cereus, giganteus	Engel.	Southern Arizona
	C. Engelmanni	Parry	Arizona
	C. phœniceus	Engel.	Valley of the Huerfano
	CUCURBITACEÆ.		
	Cucurbita perennis	Gray	Kansas
	C. digitata	Gray	Arizona
127	Cyclanthera dissecta	Arnott	New Mexico
	UMBELLIFERÆ.		
	Cynomarathrum saxatile	Nutt. in herb. Durand.	Sangre de Christo
	Heracleum lanatum	Michx.	Valley of the Huerfano
	Cymopterus alpinus	Gray	Sangre de Christo

COMPOSITÆ.

	Liatris scariosa	Willd.	Upper Huerfano
195	L. punctata	Hook.	New Mexico
	Kuhnia eupatoria	Linn.	,,
177	Pyrrhopappus grandiflorus	Nutt.	
	Erigeron grandiflorum	Hook.	Sangre de Christo
199	E. speciosum	De C.	New Mexico
	E. compositum	Pursh.	Sangre de Christo
200	E. bellidiastrum	Nutt.	New Mexico
	E. cæspitosum	Nutt.	,,
196	Brickellia reniformis	Gray	Purgatoire Valley
198	B. grandiflora	Nutt.	New Mexico
	Baccharis Wrightii	Gray	Valley of the Huerfano
	Machæranthera canescens	Gray	,, ,,
197	M. tanacetifolia	Nees.	Kansas
204	Diplopappus ericoides	Less.	,,
	Townsendia strigosa	Nutt.	Valley of the Huerfano
202	T. grandiflora	Nutt.	,, ,,
	Gutierrezia Euthamiæ	Torr. and Gray	,, ,,
	Solidago rigida	Linn.	Kansas
201	S. Missouriensis	Nutt.	,,
	Aplopappus spinulosus	De C.	,,
203	A. Fremontii	Gray	Valley of the Huerfano
	A. Nuttallii	Gray	,, ,,
	A. Parryi	Gray	Sangre de Christo
205	A. rubiginosus	Torr. and Gray	Purgatoire Valley
	Linosyris graveolens	Torr. and Gray	New Mexico
	L. Bigelovii	Gray	Valley of the Huerfano
	L. Howardii	Gray	,, ,,
	L. depressa	Gray	,, ,,
	Tetradymia inermis	Nutt.	,, ,,
	T. spinosa	Nutt.	Colorado Desert
	Tessaria borealis	Gray	Rio Grande and Rio Colorado
	Aster spinosus	Benth.	New Mexico
	A. tortifolius	Gray	Arizona
194	Pectis angustifolia	Gray	Valley of the Huerfano
	P. filipes	Gray	Prescott, Arizona
	Carphephorus junceus	Gray	Rio Colorado
166	Gaillardia pinnatifida	Torr.	New Mexico
168	G. pulchella	Foug.	,,
	Porophyllum scoparium	Gray	Arizona
	Psathyrotes ramosa	Gray	Colorado Desert
	Perityle nuda	Gray	Rio Colorado
	Palafoxia linearis	Lag.	,,
	Monolopia minor	De C.	Sierra Nevada
	Leptosyne Newberryi	Gray	,,
	Diaperia prolifera	Nutt.	New Mexico
210	Engelmannia pinnatifida	Torr. and Gray	Kansas
207	Melampodium cinereum	De C.	Valley of the Huerfano
157	Rudbeckia laciniata	Linn.	New Mexico
	Lepachys tagetis	Gray	Upper Arkansas
158	L. columnaris	Torr. and Gray	New Mexico
	Helianthus petiolaris	Gray	Valley of the Huerfano
159	H. lenticularis	Dougl.	Raton Mountains
165	Heliomeris multiflora	Torr. and Gray	Sangre de Christo
	Helianthella uniflora	Torr. and Gray	,,
	H. Parryi	Gray	,,
156	Heliopsis lævis	Pers.	Raton Mountains
	Encelia nivea	Torr. and Gray	Southern Arizona
155	Zinnia grandiflora	Nutt.	Purgatoire Valley
161	Thelesperma gracile	Gray	Kansas
160	T. filifolium	Gray	Raton Mountains

COMPOSITÆ (*continued*).

	Bidens tenuisecta	Gray	New Mexico
	B. cernua	Linn.	Fort Garland
162	Ximenesia encelioides	Cav.	Valley of the Huerfano
	Sanvitalia Aberti	Gray	New Mexico
	Bahia biternata	Gray	"
170	B. oppositifolia		
	Villanova chrysanthemoides	Gray	Valley of the Huerfano
	Lowellia aurea	Gray	Upper Arkansas
	Schkuhria Neo-Mexicana	Gray	Valley of the Huerfano
163	Dysodia chrysanthemoides	Lay.	New Mexico
169	Hymenopappus scabeosæus	Herit.	Kansas
171	Hymenopapus ———— ?		New Mexico
167	H. corymbosus	Torr. and Gray	"
	Helenium Hooperii	Gray	Sangre de Christo
	Actinella scaposa	Gray	Valley of the Huerfano
	A. acaulis	Nutt.	Sangre de Christo
	A. Richardsonii	Nutt.	Valley of the Huerfano
164	Riddellia tagetina	Nutt.	New Mexico
	Senecio exaltatus	Nutt.	Sangre de Christo Pass
175	S. longilobus	Benth.	New Mexico
	S. Bigelovii, var. Hallii	Gray	Sangre de Christo Pass
208	Grindelia squarrosa	Duval	Kansas
	Hymenoclea monogyra	Torr. and Gray	New Mexico
	Dicoria canescens	Gray	Colorado Desert
209	Berlandiera incisa	Torr. and Gray	New Mexico
	Franseria deltoidea	Torr.	Southern Arizona
154	F. Hookeriana	Nutt.	
	Artemisia tridentata	Nutt.	New Mexico
173	A. filifolia	Torr.	"
	A. frigida	Willd.	Sangre de Christo
174	A. Canadensis	Michx.	Arizona
	A. Parryi	Gray, nov. sp.	Sangre de Christo
	Grapholium strictum	Gray	Fort Garland
	Antennaria	R. Br.	Sangre de Christo
	A. dioica	Gœrtn.	"
178	Muhlgedium pulchrum	Nutt.	Valley of the Huerfano
176	Lygodesmia juncea	Dougl.	Kansas
172	Achillea millefolium	Linn.	New Mexico
206	Chrysopsis villosa	Nutt.	"

CAMPANULACEÆ.

	Campanula uniflora	Linn.	Sangre de Christo
85	C. rotundifolia	Linn.	New Mexico

ERICACEÆ.

	Vaccinium myrtilloides	Hook.	Sangre de Christo
	Arctostaphylos uva-ursi	Spreng.	Rocky Mountains
	Pyrola secunda	Linn.	"
	Chimaphila umbellata	Nutt.	"

APOCYNACEÆ.

3	Apocynum cannabinum		Kansas

PLANTAGINACEÆ.

84	Plantago Patagonica	Jacq.	Kansas

PRIMULACEÆ.

	Primula angustifolia	Torr.	Sierra Blanca
83	Lysimachia ciliata	Linn.	Raton Mountains
	Androsace chamæjasme	De C.	Sierra Blanca
	A. occidentalis	Pursh.	Kansas
	A. septentrionalis	Linn.	New Mexico

		URTICACEÆ.	
26	Humulus lupulus	Linn.	Purgatoire Valley and N. M.
		BIGNONIACEÆ.	
	Chilopsis linearis	De C.	New Mexico and Arizona
82	Martynia proboscidea	Glox.	,, ,,
		OROBANCHACEÆ.	
	Phelipæa Ludoviciana	Dougl.	Valley of the Huerfano
	P. erianthera	Engel. nov. sp.	Rio Grande, New Mexico
		SCROPHULARIACEÆ.	
81	Pentstemon Torreyi	Benth.	Raton Mountains
78	P. albidum	Nutt.	Kansas
77	P. acuminatum		New Mexico
75	P. grandiflorum	Fras.	Kansas
79	P. glaucum	Nutt. ?	New Mexico
80	P. cobeæ	Nutt.	Kansas
74	Gratiola Missouriensis	Engel.	Valley of Purgatoire
	Pambignum	Torr.	New Mexico
	Maurandia Wislizeni	Engel.	,,
71	Orthocarpus luteus	Nutt.	,,
	O. purpureus	Gray	,,
	Castilleia purpurea	Dougl.	,,
76	C. sessiliflora	Pursh.	,,
72	C. integra	Gray	,,
	Rhinanthus angustifolius	Gmel.	Sangre de Christo
	Cordylanthus Wrightii	Gray	New Mexico
		ACANTHACEÆ.	
	Sericographus Californicus	Gray	Arizona
		VERBENACEÆ.	
69	Verbena Aubletia	Linn.	Kansas
70	V. stricta	Vent.	Raton Mountains
73	Lippia reptans	Knuth.	New Mexico
		LABIATEÆ.	
63	Teucrium lanciniatum	Gray	Raton Mountains
	T. Cubense	Linn.	Valley of the Huerfano
62	T. Canadense	Linn.	Raton Mountains
	Stachys palustris	Linn.	Valley of the Huerfano
68	Hedeoma Drummondii	Benth.	Raton Mountains
	Hyptis Emoryi	Torr.	Arizona
	Scutellaria resinosa	Torr.	Kansas
64	S. Drummondii	Benth.	Raton Mountains
67	Salvia trichostemoides		New Mexico
65	Monarda aristata	Nutt.	Raton Mountains
66	M. fistulosa	Linn.	Raton Mountains
	M. Sibirica	Dougl.	Greenhorn Mountain
	Mertensia alpina	Dougl.	Sierra Blanca
61	Cedronella pallida	Lindl.	Raton Mountains
		BORAGINACEÆ.	
59	Eritrichium glomeratum	De C.	Raton Mountains
	E. crassisepalum	Torr.	Fort Garland
60	Lithospermum pilosum	Nutt.	New Mexico
		HYDROPHYLLACEÆ.	
	Nama hispida	Gray	New Mexico
58	Phacelia circinata	Jacq.	Raton Mountains

Polemoniaceæ.

	Fouquiera splendens	Engel.	Arizona
58	Gilia longiflora	Dougl.	New Mexico
56	G. tenuiflora		Raton Mountains
	G. pinnatifida	Nutt.	Sangre de Christo
57	G. pulchella		Raton Mountains

Convolvulaceæ.

54	Ipomœa Smithii (Unique)	Bell	Purgatoire Valley
	I. leptophylla	Torr.	Kansas
55	I. fandurata	Meij.	,,
51	Cuscuta Gronovii	Willd.	Purgatoire Valley
52	Evolvulus argenteus	Pursh.	,,
53	Convolvulus Hermannii		

Solanaceæ.

47	Solanum Jamesii	For.	Raton Mountains
48	S. elæagnifolium	Pursh.	,,
50	S. nigrum	Linn.	Purgatoire Valley
49	S. rostratum	Dunal.	Upper Arkansas
45	Physalis lobata	Torr.	,,
46	P. longifolia	Nutt.	Kansas
	P. mollis	Nutt.	Valley of the Huerfano
	P. cardiophylla		Valley of the Pecos, New Mexico
6	Datura meteloides	Torr.	Rio Colorado
2	Withania sordida	Dan.	Purgatoire Valley

Gentianaceæ.

	Gentiana acuta	Michx.	Sangre de Christo
	G. Parryi	Engel.	,,
	Frasera speciosa	Dougl.	,,

Asclepiadaceæ.

	Asclepias speciosa	Torr.	Upper Arkansas
	A. Jamesii	Torr.	Valley of the Huerfano
7	A. macrotis		,, Purgatoire
8	Acerates auriculata	Engel.	,, ,,
10	A. asperula	De C.	,, ,,
9	A. decumbens	Decaisne	Kansas
	A. viridiflora	Ell.	,,
	A. paniculata	De C.	,,
4	A. verticillata	Linn.	Raton Mountains
5	A. linearis	Durand	Purgatoire Valley

Nyctaginaceæ.

	Mirabilis multiflora	Gray	Valley of the Huerfano
11	M. triflora	Benth.	Raton Mountains
15	Abronia fragrans	Nutt.	Upper Arkansas
14	A. cycloptera	Gray	Purgatoire Valley
1	Oxybaphus coccineus	Torr.	Purgatoire River
12	O. nyctagineus	Sweet.	,,
13	O. angustifolius	,,	,,

Chenopodiaceæ.

	Teloxys cornuta	Torr.	New Mexico
	Sarcobatis vermicularis	Torr.	Upper Arkansas
	Obione canescens	Moq.	,,
16	O. occidentalis	Moq.	Purgatoire Valley
	Eurotia lanata	Moq.	Upper Arkansas

		AMARANTHACEÆ.	
	Acanthochyton Wrightii	Gray	Rio Grande
19	Frœlichia Floridana	Moq.	Raton Mountains
		POLYGONACEÆ.	
17	Polygonum amphibium	Linn.	Raton Mountains
20	Eriogonum Jamesii	Benth.	New Mexico
	E. racemosum	Nutt. (?)	"
22	E. tenellum	Torr.	Valley of the Huerfano
21	E. lachnogynum	Torr.	New Mexico
	E. cernuum	Nutt.	Valley of the Huerfano
	E. effusum	Nutt.	" "
	Acanthogonum rigidum	Torr.	Colorado Desert
18	Rumex venosus	Pursh.	New Mexico
		SANTALACEÆ.	
	Comandra pallida	De C.	Kansas
		EUPHORBIACEÆ.	
25	Euphorbia dentata	Michx.	Upper Arkansas
24	E. marginata		Purgatoire Valley
23	E. lata		"
	Aphora humilis	Engel.	Kansas
		JUGLANDACEÆ.	
	Juglans rupestris	Engel.	Arizona
		ANACARDIACEÆ.	
187	Rhus toxicodendron	Linn.	New Mexico
		CUPULIFERÆ.	
	Quercus lobata	Nees.	Western New Mexico
	Q. Emoryi	Torr.	Arizona
	Q. agrifolia	Nees.	California
		SPARSIFLORÆ.	
29	Croton muricatum	Nutt.	Raton Mountains
		BETULACEÆ.	
	Betula alba	Spach.	Sangre de Christo
		ZYGOPHYLLACEÆ.	
186	Kallstrœmia maxima	Torr.	New Mexico
		SALICACEÆ.	
27	Salix longifolia	Muhl.	Upper Arkansas
	Populus tremuloides	Michx.	Sangre de Christo
	P. angustifolia	Torr.	Valley of the Huerfano
	P. monilifera	Ait.	Western valleys
		GERANIACEÆ.	
185	Geranium Fremontii	Pursh.	New Mexico
		CONIFERÆ.	
	Ephedra antisyphilitica	Berland.	New Mexico to Arizona
	Pinus ponderosa	Dougl.	Rocky Mountains to the Pacific
	P. contorta	Dougl.	Sangre de Christo
	P. aristata	Engel.	"
	P. edulis	Engel.	New Mexico
	P. flexilis	James	Sangre de Christo
	P. Coulteri	Dougl.	Sierra Nevada

CONIFERÆ (*continued*).

	Abies Engelmanni	Parry.	Sangre de Christo
	A. Menziesii	Dougl.	,,
	A. Douglasii	Hook.	,,
	A. grandis	Dougl.	,,
	Juniperus occidentalis	Hook.	Arizona and New Mexico
	J. pachyphlæa	Torr.	Arizona
28	J. Virginiana	Linn.	Raton Mountains

ORCHIDACEÆ.

	Goodyera Menziesii	Lindl.	Greenhorn Mountains
	Corallorhiza multiflora	Nutt.	,, ,,

ALISMACEÆ.

30	Sagittaria variabilis	Engel.	New Mexico

AMARYLLIDACEÆ.

	Agave Americana	Linn.	Arizona

LILIACEÆ.

33	Calochortus venustus	Benth.	Valley of the Huerfano
	Lloydia serotina	Reich.	Sierra Blanca
	Yucca angustifolia	Pursh.	Kansas
	Yucca ———— (?)		Arizona and Colorado Desert
	Dasylirion graminifolium	Tucc.	Arizona
31	Allium cernuum	Roth.	Raton Mountains
32	A. striatum	Jacq.	,,

JUNCACEÆ.

	Juncus Balticus	Willd.	Sangre de Christo
	J. longistylis	Torr.	,,
	J. nodosus	Linn.	Valley of the Huerfano
	J. Mertensianus	Bong.	,, ,,
	J. tenuis	Willd.	Kansas

OXALIDACEÆ.

188	Oxalis violacea	Linn.	Kansas

CYPERACEÆ.

	Scirpus pungens	Vahl.	Smoky Hill, Kansas
	Fimbristylis spadicea	Vahl.	Valley of the Huerfano
	Cyperus inflexus	Muhl.	Upper Arkansas

GRAMINEÆ.

	Panicum virgatum	Linn.	Upper Arkansas
	P. obtusum	H. B. K.	,,
	Eriocoma cuspidata	Nutt.	Valley of the Huerfano
37	Aristida purpurea	Nutt.	Kansas
	A. Californica		New Mexico
	Agrostis scabra	Willd.	,,
	Sporabolus ramosissimus	Kth.	Upper Arkansas
	Vilfa tricholepis	Torr.	New Mexico
	Muhlenbergia gracilis	Torr.	Sangre de Christo
38	M. gracillima	Torr.	,,
	Vaseya comata	Thurb.	Musca Pass
	Pappyphorum boreale	Ledb.	New Mexico
	Pleuraphis Jamesii	Torr.	Upper Arkansas
39	Bouteloua oligostachya	Torr.	Kansas to Arizona
	B. eriopoda	Torr.	New Mexico and Arizona
	B. polystachya	Torr.	Arizona
42	B. curtipendula	Gray (Chloris)	Kansas

GRAMINEÆ (*continued*).

40	Buchloe dactyloides	Engel.	Kansas
44	Bryzopyrum strictum		New Mexico
	Munroa squarrosa	Torr.	,,
	Tricuspis acuminata	Munroe	Kansas
	T. speciosa		New Mexico
41	Lepturus paniculatus	Nutt.	Upper Arkansas
	Tristeum subspicatum	Beauv.	,,
	Danthonia sericea	Nutt.	Sangre de Christo
	D. spicata	Beauv.	,,
	Festuca ovina	Linn.	,,
	Poa Andina	Nutt.	,,
	Koeleria cristata	Pers.	,,
43	Andropogon furcatus	Muhl.	New Mexico

FILICES.

Pellæa atropurpurea	Link.	Arizona
P. longimucronata	Hook.	,,
Cheilanthes lanuginosa	Nutt.	Valley of the Huerfano
C. Fendleri	Hook.	Prescott, Arizona
Notholæna dealbata	Kunze.	Kansas
N. Fendleri	Kunze.	Valley of the Huerfano
Woodsia Oregana	Eaton.	New Mexico

APPENDIX B.

ROUTES.

TABLES OF DISTANCES AND ELEVATIONS EAST OF THE RIO GRANDE.

No. 1.—FROM THE END OF THE TRACK IN KANSAS TO THE ARKANSAS RIVER AT FORT LYON.

Elevations above Tide-water.	Distances from	Local Distances.	From Sheridan.	From Kansas City.
Feet.		Miles.	Miles.	Miles.
2,957	Sheridan, Kansas	..	..	405
3,056	To Fort Wallace	12	12	417
3,126	Pond Creek	3	15	420
..	Cheyenne Wells, Colorado	40	55	460
..	Denver Junction	10	65	470
4,192	Big Sandy	5	70	475
..	Colton's Spring	15	85	490
3,725	Fort Lyon, Colorado	35	120	525

No. 2.—RATON MOUNTAIN LINE.

Elevations above Tide-water.	Distances from	Local Distances.	From Sheridan.	From Kansas City.
Feet.		Miles.	Miles.	Miles.
3,725	Fort Lyon, Colorado	..	120	525
4,266	To Mouth of Chequaco	50	170	575
6,166	Cimarron Pass (Point of Raton Mountain)	40	210	615
..	Cimarron River	13	223	628
7,030	Capulline Summit	6	229	634
..	Vermejo	..	..	..
5,634	Red River Crossing (45 from Cap. Smt.)	45	274	679
..	Fort Union Depôt (Krœnig's)	54	328	733
6,718	Divide between Canadian and Pecos	15	343	748
6,233	Las Vegas	7	350	755
6,156	Priest's Gap	4	354	759
6,264	Chupaynas Summit	1½	356	761
..	Tecaloté Crossing	9½	365	770
5,406	Pecos River (Biyendante)	11	376	781
..	Capoté Pass	13	389	794
6,917	Cañon Blanco Summit	17	406	811
..	Lagunas	5	411	816
..	Zuñi Timber	8	419	824
..	Monte Largo	17	436	841
..	Aguaji Colorado	7	443	848
..	Tejeras	6	449	854
..	Rio Grande at Albuquerque	17	466	871
4,833	Rio Grande at Pajarida	17	466	871
4,803	Rio Grande at Isletta	18	466	871

REMARKS.—Summit of Trinchera Pass from Fort Lyon ..... 111½ miles.
" " " Elevation ..... 6,973 feet.
Foot of Flagstaff at Fort Union, Elevation ..... 6,613 feet.
Fort Craig, from Pajarida ..... 103 miles.
" Elevation ..... 4,361 feet.

No. 3.—GALISTEO ROUTE.

Elevations above Tide-water.	Distances from	Local Distances.	From Sheridan.	From Kansas City, *via* Raton mt.	From Kansas City, *via* Cimarron.
Feet.		Miles.	Miles.	Miles.	Miles.
6,917	Cañon Blanco Summit	..	406	811	739
..	To head of South Fork of Galisteo	4	410	815	743
..	Forks of Galisteo	21	431	836	764
..	Santa Fé Depôt	5	436	841	769
..	Anthracite Coal Mine (Placier Mtn.)	4	440	845	773
5,042	San Felipe	23	463	868	796
	Distances by "San Miguel Cut off."				
	To Tecaloté Intersection	..	365	770	698
	Bernal	4	369	774	702
	Pecos Crossing (1 mile above San Miguel)	8	377	782	710
	Summit of Spanish Range (2 miles west of Pigeon's Ranche)	28	405	810	738
	Galisteo Town	15	420	825	753
	Forks of Galisteo	3	423	828	756
	San Felipe	32	455	860	788

No. 4.—CIMARRON ROUTE.

Elevations above Tide-water.	Distances from	Local Distances.	From Harker.	From Kansas City.
Feet		Miles.	Miles.	Miles.
1,466	Fort Harker	..	..	218
..	To Fort Zarah (Arkansas River)	41	41	259
..	Fort Larned	35	76	294
..	Fort Dodge	51	127	345
..	Upper Cimarron Crossing of the Arkansas	24	151	369
..	Sand Creek	60	211	429
..	Lower Crossing of the Cimarron	14	225	443
..	East Side of Eight-Mile Ridge	12	237	455
..	Middle Cimarron Spring	18	255	473
..	Head of Twelve-Mile Valley	12	267	485
..	Crossing of the Cimarron	15	282	500
..	Upper Cimarron Spring	8	290	508
..	Cold Spring	7	297	515
..	Cedar Spring	14	311	529
..	Sim's Spring	14	325	543
..	Rabbit-Ear Creek	23	348	566
..	Whetstone Creek	13	361	579
..	Rock Creek	11	372	590
..	Point of Rocks	14	386	604
..	Red River	26	412	630
..	Fort Union Depôt (Krœnig's)	31	443	661
6,233	Las Vegas	22	465	683
5,406	Pecos River above Anton Chico	26	491	709
6,917	Cañon Blanco Summit	30	521	739
5,042	Rio Grande at San Felipe	57	578	796
4,803	„ at Isletta	60	581	799

No. 5.—HUERFANO ROUTE.

Elevations above the Sea.	Distances from	Local Distances.	From Kansas City.
Feet.		Miles.	Miles.
3,725	Fort Lyon, Colorado	120	525
3,892	To Bent's Fort	18	543
4,563	Huerfano Junction	50	593
6,287	Union Cross Roads	50	643
9,186	Sangre de Christo Summit	35	678
7,783	Fort Garland	25	703
7,301	Rio Grande at Toas Cañon	33	736
5,042	San Felipe	113	849
4,868	Albuquerque	30	879
4,833	Pajarida	6	885
4,803	Isletta	6	891

Remarks.—Mosca Pass, Elevation ..... 9,577 feet.
„ distance from Fort Lyon ..... 158 miles.

No. 6.—PUNTIA PASS ROUTE.

Elevations.	Distances from	Local Distances.	From Kansas City.
Feet.		Miles.	Miles.
3,725	Fort Lyon, Colorado	..	525
3,892	To Bent's Fort	18	543
..	Fort Reynolds	54	597
..	Pueblo	17	614
..	Cañon City	41	655
..	McCandless Park	10	665
..	Pleasant Valley	20	685
6,500	Forks of the Arkansas	20	705
..	Point of leaving ditto	10	715
8,600*	Summit of Puntia Pass	15	730
..	Sahwatch (East)	20	750
..	Conejos	40	790
..	Juan	83	873
5,042	San Felipe	30	903
4,868	Albuquerque	30	933
4,833	Pajarida	6	939
4,803	Isletta	6	945

* Barometer measurement.

TABLES OF DISTANCES AND ELEVATIONS FROM THE RIO GRANDE TO THE RIO COLORADO, *viâ* 35TH PARALLEL.

No. 1.—PRINCIPAL LINE (*viâ* NAVAJO PASS, WHIPPLE PASS, PARTRIDGE CREEK, AND YAMPA SUMMIT).

Elevations.	From Isletta, 12 miles south of Albuquerque.	Local Distances.	From Isletta.
Feet.		Miles.	Miles.
4,803	Isletta to—		
5,276	Puerco Summit	14	14
5,031	Mouth of El Rito	13	27
5,310	Sheep Springs	13	40
5,535	El Rito	8	48
5,633	Laguna Intersection	4	52
5,711	Laguna	4	56
5,870	Cuvero	8	64
6,185	Remances (Ricket Post)	14	78
6,375	Fort Wingate	10	88
6,557	Agua Azul	12	100
7,177	Navajo Pass (Summit of Sierra Madre)	22	122
..	Carizo Springs	6	128
6,649	Old Fort Fauntleroy (New Fort Wingate)	10	138
6,220	Zuñi and Fort Defiance Road	18	156
5,855	Cañon of Navajo Creek	30	186
5,626	Navajo Springs	14	200
5,512	Signal Hill	5	205
4,998	Little Colorado (mouth of Navajo Creek)	35	240
4,765	Sunset Crossing	35	275
5,294	Cañon Diablo	28	303
..	Cotton-wood Cañon	11	314
6,358	Padre Cañon	10	324
7,101	San Francisco Ridge	13	337
7,196	Leroux Spring	2	339
7,510	Tonto Pass (Leroux Summit, near Mount Agassiz)	3	342
7,558	Bald Peak (unnecessary summit)	9	351
7,199	Park Spring	6	357
7,206	Whipple's Pass	5	362
5,512	Forks of Partridge Creek	32	394
5,285	Russel's Tank	6	400
5,088	Mouth of Partridge Creek Valley	20	420
4,648	Crossing of Val de Chino	11	431
5,127	Beale's Pass	17	448
5,241	Yampa Gap (entrance to Yampa Cañon)	22	470
3,783	Truxton's Spring	27	497
3,170	Peacock Spring	20	517
3,473	Wallapi Pass (Railroad Pass)	14	531
1,286	Mojave Gap	27	558
353	Colorado River (near the Needles, 25 miles below Fort Mojave)	22	580

No. 2.—LAGUNA LINE.

Elevations above Tide-water.	Distances from San Felipe, on Rio Grande, 30 miles north of Albuquerque.	Local Distances.	From San Felipe.
Feet.		Miles.	Miles.
5,042	San Felipe (Rio Grande) to—		
..	Mouth of Jemez	7	7
..	Mouth of Salt Creek	21	28
..	Rio Puerco Summit	11	39
..	Rio Puerco	14	53
..	San Antonio Summit	10	63
..	Ojo de Chamisa	7	70
5,633	Laguna Intersection	8	78

No. 3.—WHITE MESA LINE.

Elevations above Tide-water.	Distances from	Local Distances.	From Park Springs.
Feet.		Miles.	Miles.
7,199	Park Spring (357 miles from Isletta) to—		
6,102 } 6,132 }	Junction with Park Creek Line	15	15
5,579	Cedar Creek Cañon (Crossing)	10	25
5,498	Point of White Mesa	23	48
5,677	Point of Blue Mesa	11	59
5,908	Summit between Val de Chino and Cataract Creek	10	69
6,166	Yampa Gap—Summit	7	76
5,178	Crossing of Aubrey Valley	10	86
5,369	Junction with Principal Line near Yampa Gap	9	95

No. 4.—LAJA GAP LINE.*

Elevations above Tide-water.	Distances from	Local Distances.	From Park Springs.
Feet.		Miles.	Miles.
7,199	Park Spring (357 miles from Isletta) to—		
..	Laja Gap (Summit)	44	44
..	Val de Chino	9	53
6,166	Mesa Gap	8	61
5,369	Yampa Junction	19	80

* Estimated.

No. 5.—COSNINO CAVES LINE.

Elevations above Tide-water.	Distances from Isletta.	Local Distances.	From Isletta.
Feet.		Miles.	Miles.
4,765	To Sunset Crossing	..	275
4,580	Mouth of Cañon Diablo	33	308
6,090	Cosnino Caves	26	334
6,428	Junction with Padre Cañon Line	6	340

Being 13 miles longer than from Sunset Crossing to same Junction by Cañon Line.

No. 6.—AZTEC PASS LINE.

Elevations above Tide-water.	Distances from Isletta.	Local Distances.	From Isletta.
Feet.		Miles.	Miles.
7,199	To Park Spring	..	357
6,132	Junction of Park Creek with White Mesa Line	15	372
5,810	In Dry Cañon	5	377
5,731	In bed of Cedar Creek	5	382
6,033	Summit bet. Cedar and Partridge Creeks	5	387
5,521	Junction of Park Creek with Whipple Pass Line	6	393
	To same point *viâ* Whipple Pass Line	$\frac{8}{10}$	$393\frac{8}{10}$
5,315	To Pearl Spring	6	399
5,285	Russel's Tank	1	400
5,088	Mouth of Partridge Valley	20	420
4,653	Junction with Yampa Line.....	8	428
4,649	Crossing of Val de Chino	2	430
5,139	Turkey Creek	12	442
5,609	Connection of Miller and Schuyler	6	448
6,117	Summit of Aztec Pass	9	457
5,170	Anvil Rock.....	13	470
4,980	Cañon	8	478
5,052	South of Cross Mountain.....	3	481
5,076	Divide between Cañon Creek and Fort Rock Spring	4	485
4,972	North of Fort Rock Spring	3	488
4,892	Divide between White Cliff and Cañon Creek	5	493
4,783	End of Line	2	495

No. 7.

				Miles.
From the Rio Grande to the Rio Colorado			by White Mesa Line	563
,,	,,	,,	by Laja Gap Line	548
,,	,,	,,	by route N. of Mount Taylor and Partridge Creek Line	558
,,	,,	,,	North of Mount Taylor and Laja Gap Line	526

TABLES OF DISTANCES AND ELEVATIONS WEST OF THE COLORADO RIVER.

No. 1.—ROUTE FROM THE NEEDLES (COLORADO RIVER) TO SAN FRANCISCO (*vid* BENITO PASS).

Elevations above Tide.	Distances from	Local Distances.	From the Colorado.
Feet.		Miles.	Miles.
1,159	To Sacramento Springs	22	22
2,579	Piute Pass (Summit)	18	40
675	Chemeuvis Pass	26	76
530*	Sink of Perry Basin	..	..
1,000	Crater Station	14	90
1,200	Volcanic Point	20	110
1,700†	Squaw Summit	10	120
2,100†	Crater Pass (Summit)	15	135
1,900†	Malpais Sink	10	145
2,375	Mojave River	25	170
2,388	Desert Lake	30	200
3,080	Eastern foot of Sierra Nevada	35	235
4,008	Tehachapa Pass	15	250
2,020	Bird Point	20	270
795	Tulare Plain	15	285
700†	Buena Vista	35	320
700†	Polvero	75	395
2,100†	Summit of Coast Range (San Benito Pass)	15	410
..	Gilroy	85	495
..	San José	30	525
..	San Francisco	50	575

* Line does not descend to level of sink.
† Estimated.

No. 2.—THE CHALAMA ROUTE.

Elevations above Tide.	Distances from	Local Distances.	From Colorado Riv.
Feet.		Miles.	Miles.
4,008	Summit of Tehachapa Pass	..	250
2,020	To Bird's Point	20	270
795	Western foot of Sierra Nevada	15	285
700*	Buena Vista	35	320
1,500 to 2,000	Chalama Pass (Summit of Coast Range)	47	367
..	Forks of Estrella	15	382
..	Mouth of Estrella	18	400
..	San Benito Branch (Head of Salinas Valley)	30	430
..	Natividad	58	488
..	Head of Pajaro Valley	12	500
Railway completed in 1868.	Gilroy	13	513
	San José	30	543
	San Francisco	50	593

* Estimated.

No. 3.—PANOCHE GRANDE ROUTE.

Elevations above Tide.	Distances from	Local Distances.	From Colorado Riv.
Feet.		Miles.	Miles.
4,008	Tehachapa Summit	..	250
2,020	To Bird Point	20	270
795	Western foot of Sierra Nevada	15	285
700*	Point of Buena Vista Lake	26	311
..	North Point of Tulare Lake	66	377
..	Posey China Creek	22	399
..	Panoche Grande Creek	23	422
2,200	Panoche Grande Pass (Summit of Coast Range)	22	444
..	Polvadero	19	463
..	Gilroy	27	490
..	San José	30	520
Tide-water.	San Francisco	50	570

* Estimated.

No. 4.—TULARE VALLEY ROUTE * (EAST SIDE).

Elevations above Tide.	Distances from	Local Distances.	From Colorado Riv.
Feet.		Miles.	Miles.
4,008	Tehachapa Summit	..	250
795	To west foot of Sierra Nevada	35	285
..	Kern River	7	292
..	Posey Creek	9	301
..	White River	24	325
..	Deer Creek	15	340
..	Tule River	5	345
..	Outside Creek	20	365
..	Deep Creek	4	369
..	Packwood Creek	3	372
..	Visalia	2	374
22	Stockton	180	554
Tide-water.	San Francisco	79	633

PACHECO PASS ROUTE AND EAST SIDE OF TULARE VALLEY.*

..	Visalia	..	374
..	To King's River	23	397
..	Fresno	38	435
..	San Luis Ranche (eastern foot of Pacheco Pass)	62	497
..	Summit of Pacheco Pass	5	502
..	Hollenback's (western foot of Pacheco Pass)	8	510
..	Gilroy	20	530
..	San Francisco	80	610

* The line would be shorter, more cheaply constructed, and less liable to interruption from floods on *west* side of Tulare Valley, but would not develop local resources as well —the west side being dry and unattractive to settlement.

No. 5.—SAN DIEGO BRANCH.

Elevations above Tide.	Distances from	Local Distances.	From Colorado Riv.
Feet.		Miles.	Miles.
675	Chemehuevis Pass, Cal. (Junction of San Francisco Line)	..	76
530	To Crater (Sink of Perry Basin)	12	88
600*	Mouth of San Diego Pass	8	96
1,140*	Porphyry Butte	6	102
1,500*	Lucky Gap	4	106
	Quartz Point	1	107
2,000*	Summit of Bullion Range (San Diego Pass)	6	113
1,500*	Morongo Basin	10	123
	(Morongo Sink, estimated elevation 1,300 to 1,500 feet)	..	..
	Antelope Ridge	8	131
	Bunch Grass Mountain	4	135
2,327*	Morongo Pass (Summit)	10	145
1,677*	Head of Morongo Cañon	3	148
1,201*	Foot of Morongo Cañon (Coahuilla Valley)	7	155
1,101	Mouth of San Gorgonia Pass	10	165
2,808	San Gorgonia Pass (Summit)	22	187
Tide-water.	San Diego (distance, estimated on straight line, is 80 miles)	100	287

Distance from Colorado River to San Bernardino, 213 miles; elevation, 1,118 feet above tide. (Valley of Santa Anna.)

* Estimated.

General Table of Distances between New York, San Francisco, and San Diego, by Kansas Pacific Railway and 35th Parallel.

Route.	From	To Kansas City.	To Sheridan, end of Track K.P.R.W. 1868.	To Denver.	To Pecos River, near Anton Chico.	To Cañon Blanco, summit of Rocky Mountains.	To crossing of Rio Grande.	To Navajo Pass, Continental Divide.	To Colorado River, near Fort Mojave.	To Tehachapa Pass, summit of Sierra Nevada.	To Gilroy (end of Track Southern Pacific Railway), 1869.	To San Francisco.	To San Diego.
1. *Viâ* Raton Mountain, Tejeras Cañon, and Partridge Creek.	Kansas City	Miles. ...	Miles. 405	Miles. 630	Miles. 781	Miles. 811	Isletta. Miles. 871	Miles. 993	Miles. 1,451	Miles. 1,701	Miles. 1,946	Miles. 2,026	Miles. 1,738
	St. Louis	275	680	905	1,056	1,086	1,146	1,268	1,726	1,976	2,221	2,301	2,013
	Chicago	488	893	1,118	1,269	1,299	1,359	1,481	1,939	2,189	2,434	2,514	2,226
	New York	1,318	1,723	1,948	2,099	2,129	2,189	2,311	2,769	3,019	3,264	3,344	3,056
2. *Viâ* Raton Mountain, Tejeras Cañon, Isletta, and Mesa Gap.	Kansas City	...	405	630	781	811	Isletta. 871	993	1,419	1,669	1,914	1,994	1,706
	St. Louis	275	680	905	1,056	1,086	1,146	1,268	1,694	1,944	2,189	2,269	1,981
	Chicago	488	893	1,118	1,269	1,299	1,359	1,481	1,907	2,157	2,402	2,482	2,194
	New York	1,318	1,723	1,948	2,099	2,129	2,189	2,311	2,737	2,987	3,232	3,312	3,024
3. *Viâ* Raton Mountain, San Felipe, San Mateo, and Mesa Gap.	Kansas City	...	405	630	781	811	San Felipe. 868	968	1,394	1,644	1,889	1,969	1,681
	St. Louis	275	680	905	1,056	1,086	1,143	1,243	1,669	1,919	2,164	2,244	1,956
	Chicago	488	893	1,118	1,269	1,299	1,356	1,456	1,882	2,132	2,377	2,457	2,169
	New York	1,318	1,723	1,948	2,099	2,129	2,186	2,286	2,712	2,962	3,207	3,287	2,999
4. *Viâ* Puntia Pass, Isletta, and Mesa Gap.	Kansas City	...	...	...	...	...	Isletta. 945	1,067	1,493	1.743	1,988	2,068	1,780
	St. Louis	...	...	...	...	...	1,220	1,342	1,768	2,018	2,263	2,343	2,055
	Chicago	...	...	...	...	...	1,433	1,555	1,981	2,231	2,476	2,556	2,268
	New York	...	...	...	...	...	2,263	2,385	2,811	3,061	3,306	3,386	3,098
5. *Viâ* Puntia Pass, San Felipe, San Mateo, and Mesa Gap.	Kansas City	...	405	630	...	...	San Felipe. 903	1,003	1,429	1,679	1,924	2,004	1,716
	St. Louis	275	680	905	...	...	1,178	1,278	1,704	1.954	2,199	2,279	1,991
	Chicago	488	893	1,118	...	...	1,391	1,491	1,917	2,167	2,412	2,492	2,204
	New York	1,318	1,723	1,948	...	...	2,221	2,321	2,747	2,997	3,242	3,322	3,034
6. *Viâ* Aubrey Route, San Felipe, San Mateo, and Mesa Gap.	Kansas City	...	...	...	746	776	San Felipe. 833	933	1,359	1,609	1,854	1,934	1,646
	St. Louis	...	...	...	1,021	1,051	1,108	1,208	1,634	1,874	2,129	2,209	1,921
	Chicago	...	...	...	1,234	1,264	1,321	1,421	1,847	2,097	2,342	2,422	2,134
	New York	...	...	...	2,064	2,094	2,151	2,251	2,677	2,927	3,172	3,252	2,964
7. *Viâ* Cimarron, San Felipe, San Mateo, and Mesa Gap.	Kansas City	...	...	...	709	739	San Felipe. 796	896	1,322	1,572	1,817	1,897	1,609
	St. Louis	...	...	...	984	1,014	1,071	1,171	1,597	1,847	2,092	2,172	1,884
	Chicago	...	...	...	1,197	1,227	1,282	1,384	1,810	2,060	2,305	2,385	2,099
	New York	...	...	...	2,027	2,057	2,114	2,214	2,640	2,890	3,135	3,215	2,927

TABLES OF DISTANCES THROUGH SONORA AND CHIHUAHUA.

No. 1.

From Camp Grant to Tucson (west of Sierra Santa Catarina)..... 54 miles.

No. 2.

From	Miles.	
Sacaton	..	
To Oneida Station	11·10	Wood, water, and grass.
Blue Water	9·70	No wood; sometimes water, grass.
Pecacho (point of mountain)	39·10	Wood, water, and grass.
Tucson	15·00	Water, wood; no grass.
	74·90	

No. 3.—DISTANCES FROM TUCSON TO THE PORT OF LIBERTAD (GULF OF CALIFORNIA) *viâ* ARIVACA, Z'AZABE, AND ALTAR. Measured by Major D. FERGUSSON, U.S.

From	Miles.	Total Miles.	
Tucson to—			
Mission of San Xavier del Bac	8·89	..	Good road; wood, water, and grass.
El Rancho Viejo	1·71	10·60	Good road; wood, water, and grass.
Punto del Agua	·79	11·39	Good road; wood, water, and grass.
Sahuarito, or Columbus	8·38	19·77	Good road; wood, water, and grass.
Roade's Ranche	8·56	28·33	Good road; wood, water, and grass.
Los Taraises	2·82	31·15	Good road; wood, water, and grass.
Reventon, or Kitchen's Ranche	2·98	34·13	Good road; wood, water, and grass.
Sopori Rancho	5·70	39·83	Good road; wood, water, and grass.
Mina Colorada	11·36	51·19	Good road; wood, water, and grass.
Arivaca	7·76	58·95	Good road; wood, water, and grass.
Los Alamos, or Old Arivaca	·50	59·45	Good road; wood, water, and grass.
Covodepe Cuesta	6·13	65·58	Good road; wood, water, and grass.
Spring in the bed of Arroyo	5·39	70·97	Good road; wood; water scarce.
Z'Azabe	8·62	79·59	Good road; wood, water, and grass.
Charco de los Mesquites	6·42	86·01	No water.
Tecalote Trail	·08	86·09	
Charco	4·58	90·67	Water, wood, and grass.
Rancheria	2·27	92·93	Good grass.
Forks of Road	·50	93·43	
Forks of Road	·35	93·78	
Ascent to Mesa	·95	94·73	
Tinaja, or Charco	6·39	101·12	Water, wood, and grass.
Los Paredones	15·01	116·13	Good road; wood, water, and grass.
Jesus Maria	14·73	130·86	Good road; water, wood; grass scarce.
Altar	8·58	139·44	Good road; grass scarce; wood, water.
Dry Arroyo	4·05	143·49	Good road.
Road to Zepedas Ranche	6·20	149·69	Good road.
Foot of Hill	2·23	151·92	Good hard road.
Summit of Hill	·36	152·28	
Pitiquito	1·16	153·44	Good hard road; wood, water, grass.
Cienega and Caborca Road	7·59	161·03	Good hard road.
Laguna Mosca	5·00	166·03	Good hard road; no water in dry season; good grass.
Bajia de Aquituna	6·58	172·61	Good level road; wood and grass; no water.
El Zanjon (dry arroyo)	2·97	175·58	Good road; wood and grass.
Tinaje del Viejo	7·39	182·97	Water.
Angostura Pass	7·17	190·14	Good hard road; wood, water, grass.
Picu	11·14	201·28	Good hard road; wood, water, grass.
Pozo de las Cristolas	·57	201·85	
Charco de los Papagos	1·00	202·85	
Tinaja del Tule	4·12	206·97	Very little water or grass.
Derisadero Prieto	4·50	211·47	Good hard road; wood; no grass.
Point where Gulf is first seen	·83	212·30	
Port of Libertad	21·93	225·23	Wood, water; no grass; road bad.

No. 4.—DISTANCES FROM TUCSON TO GUAYMAS, *viâ* TUBAC AND HERMOSILLO.

From	Miles.	Total Miles.	
Tucson to—			
San Xavier del Bac	9	9	Wood, water, and grass.
Agua de la Canoa	25	34	Wood, water, and grass.
Ford of Santa Cruz River	12	46	Wood, water, and grass.
Tubac	2½	48½	Wood, water, and grass.
Rancho de las Calabasas	13	61½	Wood, water, and grass.
Agua Zarca	23¼	84¾	Wood, water, and grass.
Cibuta	11¼	96	Wood, water, and grass.
La Casita	3½	99½	Wood, water, and grass.
Los Alisos Rancho	3½	103	Wood, water, and grass.
Imures	11½	114½	Wood, water, and grass.
San Ignacio	6½	121	Wood, water, and grass.
La Magdalena	5	126	Wood, water, and grass.
Santa Anna	12	138	Wood, water, and grass.
Barajita	13	151	Bad water, wood, and grass.
Rancho Querobabi	12	163	Wood and grass; water in tanks.
Rancho de Tabique	36	199	Wood and grass; water in tanks.
Hacienda de la Labor	28	227	Wood, water, and grass.
Hacienda de Alamita	8	235	Wood, water, and grass.
Hermosillo	13	248	Wood, water, and grass.
Rancho de la Poza	16	264	Wood, water, and grass.
Rancho de la Palma	16⅜	280⅜	Wood, water, and grass.
Rancho del Posito	8	288⅜	Water often scarce.
Rancho de la Cunequita	15¾	304⅛	Good water, &c.
Rancho de la Moche Buena	19⅝	323¾	Water sometimes scarce.
Rancho del Caballo	9	332¾	Wood, water, and grass.
Guaymas	10¼	343	

No. 5.—DISTANCES FROM SAN XAVIER DEL BAC TO FRANKLIN (RIO GRANDE).

From	Miles.	Total Miles.
San Xavier del Bac to—		
Cienega de los Pimas	24·	..
San Pedro River	23·52	47·52
Quercus Cañon	6·	53·52
Playa de los Pimas (Croton Spring)	30·76	84·28
Fort Bowie	30·	114·28
Cienega del Sauz	25·30	139·58
Ojo de la Vaca	54·05	193·63
Rio Miembres	17·	210·63
Cooke's Spring	17·60	228·23
La Mesilla	53·11	281·34
Fort Fillmore	2·50	283·84
Franklin	40·	323·84

No. 6.—DISTANCES FROM FORT YUMA TO ALTAR, ACROSS THE SONORA DESERT.

From	Miles.	Total Miles.
Fort Yuma to—		
Leave Rio Gila	2·63	..
Las Cuevitas	26·45	29·08
Las Tinajas Altas	16·49	45·57
El Corral	15·33	60·90
El Tule	1·15	62·05
La Salada	44·89	106·94
Agua Dulce	2·89	109·83
Quitobaquita	6·54	116·37
Santo Domingo	5·70	122·07
Rancho de Sonoyta	7·73	129·80
Pozo del Macias	47·15	176·95
Rancho del Soñi	8·70	185·65
Las Caborqueñas	22·69	208·34
Rancho del Bamori	15·83	224·17
Las Tinajitas	6·73	230·90
Altar	4·65	235·55

No. 7.—DISTANCES FROM ALTAR (SONORA) TO EL PASO (NEW MEXICO), *vid* COCOSPERA, GUADALUPE CAÑON, AND JANOS.

From	Miles.	Total Miles.
Altar to—		
Charco de San Raphael	8·	..
Rancho del Ocuca	18·4	26·4
Santa Anna	21·38	47·78
Imures	23·68	71·46
Rancho de Babasaqui	5·	76·46
Cocospera	15·81	92·27
San Lazaro	17·28	109·55
Santa Cruz	7·18	116·73
First Tributary of the Rio San Pedro	13·50	130·23
Second Tributary of the Rio San Pedro	16·	146·23
Third Tributary of the Rio San Pedro	1·97	148·20
Fourth Tributary of the Rio San Pedro	0·50	148·70
Fifth Tributary of the Rio San Pedro	3·	151·70
Sixth Tributary of the Rio San Pedro	9·81	161·51
Ash Creek	22·32	183·83
San Bernardino	30·16	213·99
Entrance of Guadalupe Cañon	9·27	223·26
Spring in Cañon	12·73	235·99
San Lino Spring	11·70	247·69
San Francisco Spring	16·10	263·79
Pelatado	27·13	290·92
Janos	10·50	301·42
Corralitas	20·26	321·68
Mines of San Pedro	19·	340·68
Santa Maria	27·18	367·86
Salado	27·	394·86
Salamurca	36·31	431·17
El Paso	25·02	456·19

No. 8.—DISTANCES FROM ALTAR, *viâ* OQUITOA, EL ATIL, TUBATAMA, AND ZARIC, IN SONORA, MEXICO, TO TUCSON, ARIZONA. Measured by Major DAVID FERGUSSON, First Cavalry, California Volunteers.

From	Miles.	Total Miles.	
Altar to—			
Oquitoa	6·20	..	Good hard smooth road; grass scarce; water and wood abundant.
Gonzales' Mill	1·23	7·43	Good hard smooth road; grass scarce; water abundant.
El Rancho Realito	1·94	9·37	Good hard smooth road.
El Atil	8·48	17·85	Hard road; some grass, wood, water.
Santa Teresa	4·13	21·98	Good road; grass, wood, and water.
First Crossing of River	·61	22·59	Good hard road.
River Bottom	·85	23·44	Sandy road.
La Puenta	·91	24·35	
Tubatama	1·56	25·91	Fair road.
Ford of River	·30	26·21	
Moreno's Mill	·46	26·67	
Zigzags	·52	27·19	
Descent into Valley	1·46	28·65	
El Ranchito	·85	29·50	
Top of Hill	1·11	30·61	
Top of Hill near Estancio	1·97	31·68	
El Estancio (Rancho)	·48	32·16	Rocky road; water and grass abundant.
Van Alstine's Ranche	1·14	33·30	Wood, water, and grass abundant.
Forks of Road	3·05	36·35	
Babocomari Hill	1·87	38·22	
Babocomari Ranche	1·27	39·49	
Cañon de Quimori	3·58	43·07	
Saric, or Zaric	·54	43·61	Good hard road; good grass, water.
Las Galeritas	3·46	47·07	Rough road; wood and water.
Rancho de Busani	1·79	48·86	Good hard road; wood, water, grass.
Forks of Road	3·16	52·02	
Charco de los Fusones	8·00	60·02	Hard level road; grass, wood, water.
Agua Escondida	1·32	61·34	Good level road; wood, water, grass.
La Tinaja	2·91	64·25	Fine level road; water, wood, grass.
Las Tres Bellotas	4·90	69·15	
Arivaca and Tubatama Trail	1·09	70·24	
Foot of Hill	1·33	71·57	Road good and hard; grass and wood.
First Bench of Hill	·30	71·87	Steep hill; fine grazing.
Summit	1·61	79·48	
Foot of Hill	·57	80·05	
Arivaca Trail	1·03	81·11	
Las Jarretillas	1·21	82·32	Water in spring; fine grass, wood.
Angle in Road	·80	83·12	
Mouth of Cañon	·70	83·82	Grass, wood; road tortuous and stony.
Mina de Logavina	·48	84·30	Fair road.
Las Fraguitas	·30	84·60	Road rocky and winding; no water.
Hill above Arivaca Valley	·74	85·34	
Arivaca	2·03	87·37	Good road; fine grass, wood, water.
Tucson	58·95	146·32	Good road.

No. 9.—ROUTES PRACTICABLE FOR A RAILWAY TO GUAYMAS, WITH COMPUTED DISTANCES FROM RAILROAD PASS AND SACATON.

		Miles.
1st.	From Railroad Pass, *viâ* Rio San Pedro, Cocospera, Imures, Hermosillo..	428
2nd.	From Railroad Pass, *viâ* Cienega de los Pimas, Rio Santa Cruz, Tubac, Imures, and Hermosillo.....	418
3rd.	From Railroad Pass, *viâ* Cienega de los Pimas, Arivaca, Z'Azabe Valley, Altar, Hermosillo	429
4th.	From Sacaton (Rio Gila), *viâ* Cababi Mines, Fresnal, Altar, Hermosillo..	394

No. 10.—TOTAL DISTANCE FROM NEW YORK TO SAN DIEGO AND GUAYMAS.

By 32nd parallel to Guaymas—

	Miles.
New York to Kansas City	1,318
Kansas City to Rio Grande (between Albuquerque and Isletta)	799
To Fort Craig	102
Railroad Pass.....	204
San Pedro Crossing	46
Tubac	58
Calabasas	13
Los Nagdales	8
Imures.....	49
La Magdalena	11
Hermosillo	110
Guaymas	86
Total.....	2,804

	Miles.
By 35th parallel from New York to San Diego	2,927
By 32nd parallel from New York to San Diego (by Warner's Pass)	2,96

No. 11.—DISTANCES FROM JANOS (CHIHUAHUA) TO OJO DE VACA (NEW MEXICO). Furnished by Mr. CHANDLER, of the Mexican Boundary Commission.

From	Miles.	Total Miles.
Janos to—		
Las Lagunitas	8·7	..
Palos Blancos	13·8	22·5
Espia	14·1	36·6
Desechado	18·8	55·4
Carrizzalillo	19·3	74·7
Mountain Point	22·6	97·3
Ojo de Vaca	20·	117·3

No. 12.—DISTANCES FROM MESILLA, NEW MEXICO, TO THE CITY OF CHIHUAHUA, MEXICO, *viâ* EL PASO. Measured by Major DAVID FERGUSSON, First Cavalry, California Volunteers.

From	Miles.	Total Miles.	
Mesilla to—			
Fort Fillmore	6·65	..	Fair road.
Texas Boundary Line	17·00	23·65	Fair road; wood, water, and grass.
Hart's Mill	19·53	43·18	Fair road.
Franklin	1·20	44·38	Wood, water, and grass procurable
Puerto de los Indios	9 79	54·17	Good hard road; water and wood.
La Ciga	11·84	66·01	Good hard road; thin grass.
Point of Low Sierra	6·52	72·53	Good hard road; grama grass.
Samalaguea	9·00	81·53	Good road, good grass, wood; no water.
Top of low Hill	3·22	84·75	Grass *en route.*
Sand Hills	1·05	85·80	Fair road.
End of Meadow	3·71	89·51	Road sandy; wood and grass.
Dry Camp	1·58	91·09	Road sandy and heavy; no water; grass and wood.
El Lucero	29·06	120·15	Road sandy; wood, water, and grass abundant.
La Laguna	5·88	126·03	Good road; grass and wood; warm sulphur water.
Carrisal	15·04	141·07	Road level; grass, wood, and water.
Ojo Caliente	11·52	152·59	Road level; good grass, wood, water.
Arroyo del Carmen	1·43	154·02	Good road.
Dry Camp	22·58	176·60	Good road through grass valley.
Gallego	19·58	196·18	Good hard road; no water; good grass and wood.
Dry Camp	11·42	207·60	Fine hard road; wood and grass.
Forks of Encenillas	7·33	214·93	Fine hard road; grass.
Arroyo del Sauz	24·53	239·46	Good level road; fine grass, water, and wood.
Pinolito	3·34	242·80	Good level road; grass and water.
El Sauz	6·14	248·94	Good level road; grass and water.
Sacramento	13·87	262·81	Good level road; grass abundant; wood.
El Salitre	8·87	271·68	Fine hard level road; grass scarce.
Chihuahua	8·23	279·91	Fine hard smooth road.

APPENDIX C.

PHOTOGRAPHY.

As by far the greater proportion of travellers who start on their journeys through remote regions with the necessary chemicals and apparatus for taking photographic views do not succeed unless they have previously become thoroughly acquainted with the art, I will here give the formulæ which were written out for me by my friend Mr. Browne, and which did me good service all through my trip. I am sure they will be found most useful to those who desire to take views of what they see, and are, like myself, unacquainted with photography.

THE GLASS.

Take off the sharp edges by rubbing them against each other. Clean with water and wipe dry, then rub with alcohol and flannel, and polish with a silk duster. Brush off the dust with a camel's-hair brush.

THE COLLODION.

Iodide of ammonia	5 grains.
Bromide of cadmium, or magnesium	2½ „
Alcohol	1 ounce.
Ether	½ „

Pary's gun-cotton, 7½ grains to the ounce of mixture.

NEGATIVE BATH.

Fused nitrate of silver	45 grains.
Water	1 ounce.

Add 5 grains of iodide of silver, or let a coated plate remain in the bath overnight; make it very slightly *acid with pure nitric acid.* Filter.

DEVELOPER.

Protosulphate of iron	20 grains.
Acetic acid, No. 8	2 drachms.
Water	1 ounce.

In warm weather add equal parts of cold water, to reduce the strength of the iron, and then filter.

After developing with iron, should the negative not be strong enough to print, wash well, and pour over it the following solution of citrate of silver :—

Citric acid	30 grains.
Nitrate of silver	20 „
Water	1 ounce.

Divide the water into equal parts; to one portion add the citric acid, and the nitrate of silver to the other; when dissolved, pour the solutions together. Filter and use.

To strengthen a negative, pour from the stock bottle about half an ounce of citrate of silver into a small bottle, flow it over the plate, drain (the solution may be used several times), and redevelop with iron developer; in warm weather diluting the strength of iron to 10 grains to the ounce. Keep the developer moving over the plate, watching carefully so that no fogging takes place. Of course this must be done in the dark room. By this treatment the negative will quickly be made strong enough to print without losing the middle tints. Wash well and fix.

FIXING SOLUTION.

Hyposulphite of soda, saturated solution.

PRINTING PROCESS.

SILVER SOLUTION.

Nitrate of silver	80 grains.
Water	1 ounce.

Add ammonia carefully, until there is a heavy precipitate of oxide of silver, then clear up with nitrate of ammonia, and add half an ounce of alcohol to the pint of bath. Filter and use. Do not let the silver fall below 60 grains to the ounce; test with a standard solution of salt, as the hydrometer will not give the correct amount of silver. This bath will keep perfectly clear. I have had the same solution in use over two years, of course strengthening it frequently, never adding silver alone, but using a larger amount of silver, say 100 or 200 grains to the ounce of water, also increasing the proportion of ammonia and alcohol. This is done to prevent a large bulk of solution.

Other baths were found to work as well as this formula, but each had a tendency to become clouded.

The great recommendation of this process for amateurs is, that the bath may be put aside for one month or twenty; at either time it will be found perfectly clear and ready for use, only requiring filtering as a matter of prudence, there being a very slight deposit in the bottom of the bottle after standing.

Float the papers from one to three minutes; it will answer for either plain or albumen papers. Dry perfectly, and expose to the fumes of ammonia for ten minutes.

TONING.

For the last five years I have entirely given up the use of chloride of gold in a crystallised form, using instead an acid solution of gold, prepared in the

following manner:—Having obtained a solution of metallic gold, of a known amount, in aqua regia, evaporate in a sand-bath until the solution appears like syrup, then dilute with water, in the proportion of 1 grain of gold to the drachm of water; filter, and it will be ready for use. No change or precipitation of gold can take place, so that the bottle is always in good order.

TONING BATH.

Warm water	8 ounces.
Chloride of gold	2 drachms.

Neutralise carefully with ammonia. Do not get an excess, or the prints will be liable to blister, then add 30 grains of salt.

Wash the prints well before toning, then place them in a dish of warm water, putting half-a-dozen at a time into the toning bath. Almost any colour desired may be obtained.

Of all the many toning processes given to the public—some very complicated ones among them—none, I think I am correct in saying, gives more certain or better results than the old alkaline bath. Some very strong prints are possibly improved by the addition of a small quantity of nitrate of uranium. This chemical is, however, tricky and unreliable. Wash for half an hour, and fix.

FIXING SOLUTION.

Hyposulphite of soda	1 ounce.
Water	6 ounces.

When the hyposulphate is dissolved, add to it three or four drops of ether; wash thoroughly. If possible, use warm water in the last washing.

* * * * * * *

The climate in which I worked was usually so dry that I had to use my collodion much diluted with ether; and so alkaline was the water in many places, that the thin film became, when washed, even thinner; and the negative, although it was *usually full of detail*, was not strong enough for ordinary printing; and what I gained by strengthening, I lost again by rewashing with the bad water. Such negatives should be kept as they are, *and never destroyed*, for they are the very best from which to take sunlight enlargements afterwards.

When my bromide of cadmium failed, I replaced it with iodide of potassium, and obtained quite as good results with landscapes, with the advantage of having a more permanent collodion. The softest pictures were, however, from the bromide of magnesium collodion, although this will not keep more than a fortnight. I found the first hour after sunrise and the last before sunset to be the best for taking views, as the air was calm and clear, and the temperature low.

APPENDIX D.

MAJOR J. W. POWELL'S REPORT ON HIS EXPLORATIONS OF THE RIO COLORADO IN 1869.

For two or three years I have been engaged in making some geographical studies in the mountains to the east and north of the Colorado Basin, and while pursuing them the thought grew into my mind that the cañons of this region would be a book of revelations in the rock-leaved Bible of geology. The thought fructified, and I determined to read the book; so I sought for all the available information with regard to the cañon land. I talked with Indians and hunters; I went among the Mormons to learn what they knew of this country adjacent to the "Kingdom of God," the home of the "Church of Jesus Christ of Latter-day Saints;" I read the reports of the United States' Surveys, and I explored cañons of the tributary streams that I thought would represent somewhat the nature of the Grand Cañon, on account of similar geological and physical features. From the fabulous stories, the facts, and the reports, and from the knowledge of other cañons, I came to the belief that the "Grand Cañon of the Colorado" could be explored by descending the river in small boats. I also arrived at the conclusion that what was known as the "Grand Cañon" was in fact a series of cañons, forming the banks or walls of the Upper Colorado and the lower portions of the Green and Grand, that unite to form it. These two streams unite in cañons, and some persons held that the vaguely defined "Grand Cañon" was continued up the Green, and others that it was continued up the Grand, while others still asserted that these streams united in a valley. One man assured me that he, with several others, had laid out a city at the junction, but was driven away by Indians.

Having made up my mind to explore the gorge, I came from the mountains to Chicago last spring, to procure outfit and build boats. Four of these were made on a model devised for the purpose of navigating cañon streams; and taking them out to Green River Station, where the Union Pacific Railroad crosses the Green, I was ready to embark. There I had a party of nine men awaiting my arrival, and anxious to enter the "Great Unknown" with me—men all experienced in the wild life of the country, and most of them in boating on dangerous streams.

On the 24th of May we started. For a few days our way was through a river

of low cañons and small green valleys, until we reached the Uintah Mountains. Through this range the river has cut a winding channel, forming the Uintah system of cañons. Near the lower end of this series Yampa River enters the Green by a cañon. Further down, in a valley portion the Uintah and White rivers come in. About thirty miles below this point we enter another series of cañons. Low walls of grey, buff, and rust-coloured sandstone shut us in. These walls slowly increase in height as we advance; the grey rocks are lost; dark red sandstone appear; the walls are broken down by lateral cañons, increasing in number until we are in the heart of the Cañon of Desolation. Sometimes these lateral cañons are so crowded, that the rock between them stands as a narrow wall hundreds of feet high, the end being, of course, towards the main cañon.

Some lateral cañons have their own lateral cañons, there a fourth series, cutting the walls into sections, whose towering summits, though large enough to support cathedrals, seem scarcely to furnish footing for a man. Two thousand feet—three thousand feet overhead is the summit of the walls, while rocks, and crags, and peaks rise higher, and still higher away back from the river, until they reach an altitude of nearly five thousand feet. These rusty, grey, and dark red sandstones have no beauty of colour. A few greenish brown cedars are seen, looking not like shoots of evergreen spray, but like clumps of knotty war clubs bedecked with spines. These, with a little sage, constitute all the verdure. We next ran through Coal Cañon, and passed the mouth of Little White River; then came a valley region, where we passed the mouth of the San Rafael, and soon entered Still-water Cañon. The river winds through this with a quiet current, as if in no haste to leave this beautiful cañon, carved out of orange sandstone. All along its walls domed alcoves and amphitheatres have been cut out of the solid rock; grottoes and caves abound, narrow lateral cañons, channels of rivulets, born of a shower, and born again of a shower, are cut as clefts in the rocks; and at every curve on the inner side is a spot of willow-bordered meadow. Then the walls grow higher, the river swifter, and we glide down to the junction of the Green and Grand. Here the walls are nearly 1,300 feet high. But away back from the river are lateral cañons, and cañon valleys, the floors of which are at about the same altitude as the immediate walls of the main cañon, and the walls of this upper set are hundreds of feet higher, and still further back again the country is cut into a labyrinth of cañons. The main walls at the junction are not vertical, but have the slope of broken rocks tumbled down, while the lateral cañons have mostly vertical walls with a sloping talus at the base.

We remained at the junction several days, and then rowed out into Cataract Cañon. Soon we heard the roar of waters, and came upon a succession of rocky rapids and cataracts. Over some of these we were compelled to make portage: usually only the cargoes were carried over the rocks and the boats were let down with lines; but now and then boats and all had to be carried. When these rapids and cataracts were unobstructed by rocks, or where there was any passage, we were able to run them, never finding any fall greater than nineteen feet in this cañon. Sometimes the waves below would roll over a boat and fill the open part; but they could not sink it, as each one was decked fore and aft, and so had a water-tight compartment at either end. Now and then a boat would roll over; but, clinging to its sides until they could right it, the men would swim to the shore, towing it with them. We found much difficulty in

the whirpools below; for at times it was almost impossible to get out of them. They would carry us back under the falls, they would dash us against the rocks, or they would send us whirling down the river. For twelve days we toiled through this cañon, stopping once to measure the altitude of its walls near its highest point, and finding it nearly 2,500 feet. This was at the axis of a vast fold in the strata, and from that point the upper rocks slowly came down with a gentle dip to the south-west until we reached the foot of the cañon, 45 miles from its head. A rocky valley cañon was found here on the left, and the river made a bend around a sharp point on the right, which point was set with ten thousand crags and rocks. We called it Mille-crag Bend, and sweeping around this in a rapid current, our boats shot into Narrow Cañon, down which we glided almost at railroad speed, the walls rising vertically from the water 1,300 feet high at its head, and coming down to high-water mark at the foot, 7 miles below, where the Dirty Devil, a river of mud, enters from the right. Now we had come again to the red and orange sandstone, and the walls were of beautiful bright rock, low at first, but as we cut down through the strata, rising higher and higher. Now and then, on this and that side, the rocks were vertical from the water's edge; but usually they were cut into mounds and cones and hills of solid sandstone, rising one above the other as they stretched back in a gentle slope for miles. These mounds have been cut out by the showers from the bright orange rock, and glitter in resplendent beauty under the mid-day sun. Hour after hour have we gazed entranced on them, as they faded in the perspective and retreated to the rear; for the river was gentle, though swift, and we had but to steer our boats, and on we went through this land of beauty and glory.

On the 31st of July we reached the mouth of the San Juan, at the foot of Mound Cañon, and went into camp for a day or two's rest. Then we started again. We had now run once more into dark red and chocolate-coloured sandstones, with slate-coloured beds below: these usually formed vertical walls, occasionally terraced or broken down, and from the crest of these the orange mounds sloped back, bearing on the top of each mound some variegated monument, now vertical, now terraced, now carved by time into grotesque shapes, such as towers, pinnacles, &c. These monuments stood alone or in groups, and spread over the landscape as far as the eye could reach. The little valley of the Paria River terminates this cañon, making it about 100 miles long. We named it Monument Cañon.

By this time the river had cut through the sandstones and reached the limestones below them at this point, and as we advanced the channel was cut into this new strata. We entered between walls, low but vertical, which gradually increased in altitude to the foot, where they were 2,900 feet high, terraced and broken down into crags above. Half-way down the cañon we found the lower strata appearing as marble; the marbles were white, grey, and slate-coloured, then pink, purple, and brown; other strata appeared which were variegated with these colours intermixed, until at last we had 400 feet of marble wall, mostly variegated, from the water's edge. They were fretted by the water, embossed with strange devices, and polished into beauty. Where there were patches of marble floor left bare, large shallow water basins appeared, hollowed out by the whirlpools of the flood season, and filled with clear, sparkling water —a beautiful contrast to the red muddy river. Springs gushed from these limestone strata, forming fountains which plunged into marble fonts, and formed

a strange contrast, after every shower, to the cascades of red mud which poured over the walls from the red sandstone above, with a fall of hundreds of feet. We called this Marble Cañon; it terminated at the mouth of the Little Colorado (Colorado Chiquito), and was about 36 miles long.

Here a short rest, and then we pulled on the home stretch—not a very short one either—nearly 300 miles by river to the mouth of the Virgen. The lower members of this carboniferous formation are of dark rust-coloured sandstones, sometimes almost black. We soon ran through these, and through silurian red sandstone, and about 15 miles below the mouth of the Little Colorado struck the granite.

From the mouth of that stream to the mouth of the Virgen, our objective point, the general course of the river is to the west; but it makes three great curves to the south and three corresponding curves to the north. At the extremity of the southern curves the walls are granite at the base, reaching to an altitude of 800 feet. This usually rises from the water in almost vertical cliffs, set above with ragged crags, then a sloping terrace 100 to 500 yards wide, then walls of sandstone and marble towering 200 or 300 feet towards the heavens. In the northern bends the marble comes down to the water's edge. In the southern bends the river runs raging through a narrow gorge filled with rapids and cataracts, often falling at a plunge from 5 to 20 feet—the greatest being 22 feet. Over these we usually had to run, as the granite walls rarely gave foothold, though some portages were made. The roar of a cataract could always be heard for half a mile or more, so that we never came upon them unapprised of danger.

In the last great bend to the south we came upon a series of cataracts and rapids crowded together into a distance of three-fourths of a mile; a stream came down through a narrow cañon on either side, and above their mouths we found a foothold to land, so we stopped to examine. On the river there seemed to be great danger, and no portage could be had. We arrived in the morning, and the day was spent in exploring and trying to decide some method of getting over the difficulty. I found that we could climb to the summit of the granite, 800 feet high, and passing along the terrace could descend to a point below; but it would require ten days to get our boats and cargoes over, and we had scant five days' rations. When I returned to camp at night I announced to the men that we must attempt to run it. After supper one of them came to me and asked if I was willing that he and two others should leave the river and walk out over the mountains; they thought that they could climb out of the cañon, up the channel of the right-hand creek. Of course I objected; but they were determined to go. An hour's talk failed to shake their resolution; so I sat up all night, made observations for the latitude and longitude of that point, and then walked up and down a little sand beach until morning.

On the morrow the men were still determined to go, and I hastily fitted out the little party with guns, ammunition, and a small store of rations. In the meantime those going down the river were ready to start. Not being able to man it, I tied up one of the boats and abandoned it. When all was ready we shook hands, and some tears were started, as each party thought the other going to destruction. "Good-bye," and away went our boat over the first cataract, then amongst the rocks and over the second to the left of a huge rock and whirpool, and then leaping a third, it shot into an eddy below.

The boats were half filled with water, but that was of common occurrence; we really found it less dangerous than a hundred we had run above. The men that were left sat on the cliffs and watched us go safely over, so we went into camp and waited two hours, hoping that they would join us with the boat left tied to the rocks above. But we never saw nor heard of them since.

That same afternoon we passed one more dangerous rapid, and then had fair sailing to the end of the cañon, where the river debouches into Mormon Valley, so named by our party.

This ended the exploration of the Grand Cañon of the Colorado—its head at the confluence of the Little Colorado, its foot at the entrance of Mormon Valley, its length 238 miles, its altitude from 2,500 to 4,000 feet. A number of clear streams flow into it from either side, the largest coming down from the Buckskin Mountains on the north, which we named Right-angle River.

I have mentioned the terraces of the southern bends; these have been the sites of ancient Indian villages, inhabited by a race of diminutive people now almost extinct. Their little clusters of houses, found on the south side of the river, were 800 or 1,000 feet above the water. They were built of stone laid in mortar, and seem to have had reservoirs for water. Fragments of their pottery are found scattered about in great profusion, and deeply worn foot-paths leading from village to village, or down to the river, or up to the summit plain, were frequently seen. On the northern bend their dwellings were near the river. Some of the ruins seem to be centuries old, and others to have been inhabited by the present generation—the latter were found near the mouth of the Little Colorado. Other ruins and fragments of pottery were found in the cañons above, and away up in the valleys of the Uintah. Only a few villages of these interesting people now remain in the country to the south-east.

Below the Grand Cañon the river and adjoining country had been explored by Mormon parties, and here ended the "Great Unknown," no longer thus to be designated. One party had crossed through Mormon Valley; another had brought a skiff down the Grand Wash just below it, and descended in it to the mouth of the Virgen—to Call's Landing; and still other parties have passed through the country whose reports I found quite correct, except that they a little over-estimated the distances. Alternating valleys and cañons were passed till we reached the mouth of the Virgen, where we came upon three white men dragging a seine. They proved to be Mormons, who had been sent on to prepare for a large settlement of people, which will be sent here by the Church, to build up another of those wonderful villages seen only in the "Kingdom."

The whole region was one of great scenic beauty and grandeur; the constant change in geological structure made a constant change of scenery. The high walls enclosing a tortuous river, shut off the view before, and, as we advanced, it opened out, ever bringing into view some new combination of marvel or beauty. The impression of this scenery was the more vivified by a little anxiety—the shadow of a pang of dread ever present to the mind.

Of my party, I should like to say that some left me at the start, cutting the number down to ten, including myself. One left me at the mouth of the Uintah, three left me as mentioned before, and five went through. These were Captain W. H. Powell, John C. Sumner, George T. Bradley, W. Rhodes Hawkins, and Andrew Hall. * * * *

I append a table of approximate distances, from source to mouth of the Rio Colorado, collected from the most authentic sources, 925 miles of which were traversed and measured by Major J. W. Powell.

APPROXIMATE DISTANCES BY RIVER.

	Miles Intermediate.	Total in Miles.
Green River.		
From head-waters of Green River to Green River Crossing (on the U. P. R. R.) about	130	130
Given by Major J. W. Powell. Through valley to mouth of Henry's Fork	60	190
„ Uintah series of Cañons	70	260
„ valley past mouths of Unitah and White rivers	50	310
„ Lower Green River system of cañons to junction of Green and Grand	190	500
Rio Colorado.		
Through Cataract Cañon	45	545
„ Mound Cañon	7	552
„ Narrow Cañon to mouth of San Juan River	68	620
„ Monument Cañon to mouth of Paria River	100	720
„ Marble Cañon to mouth of Little Colorado	36	756
„ Grand Cañon	238	994
„ valley to mouth of Virgen	43	1,037
„ Callville	18	1,055
Fort Mojave	75	1,130
The Needles	25	1,155
Mouth of Bill William's Fork	60	1,215
Fort Yuma	190	1,405
Head of the Gulf of California	150	1,555